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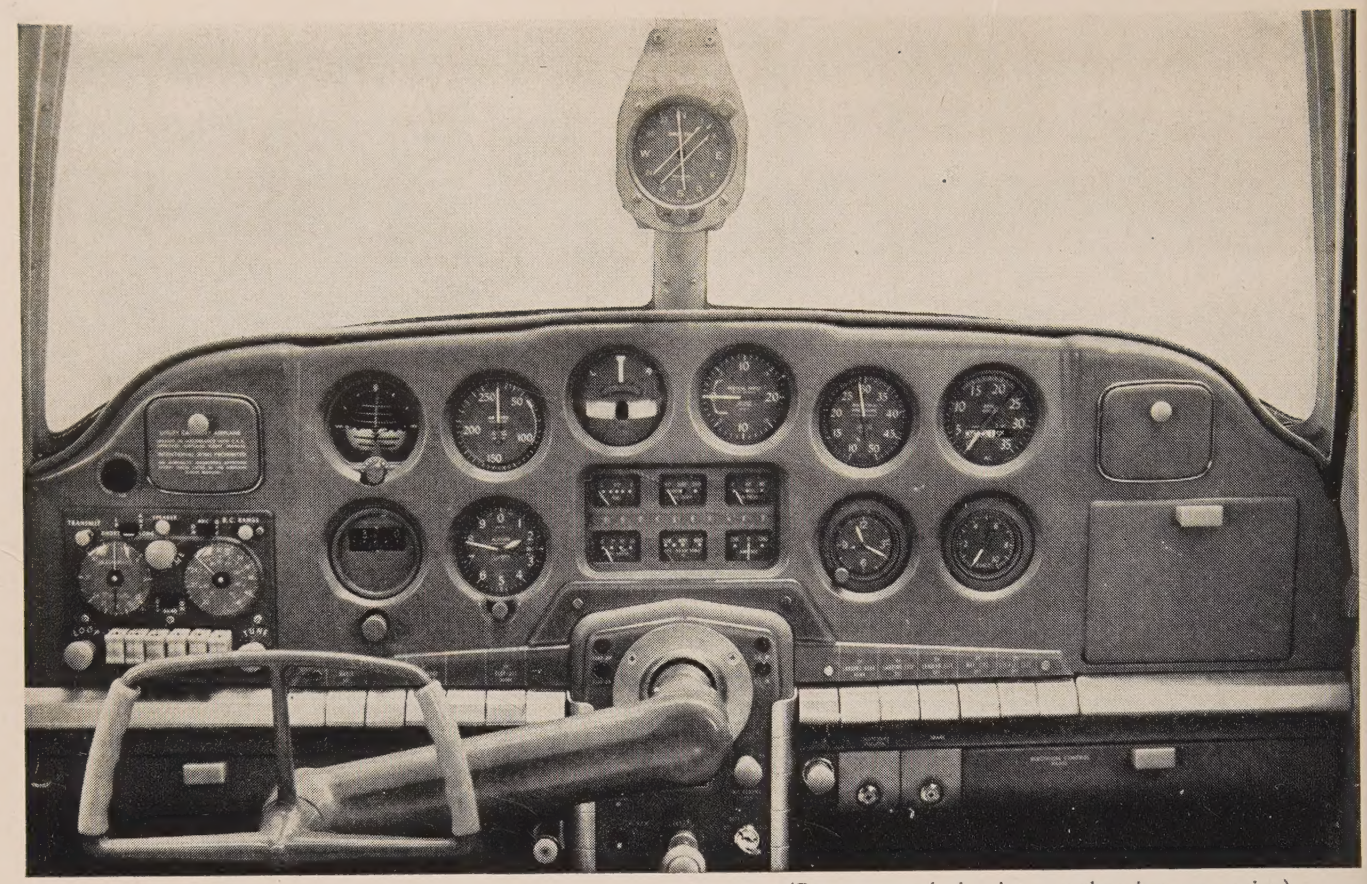

(Bonanza panel showing complete instrumentation)

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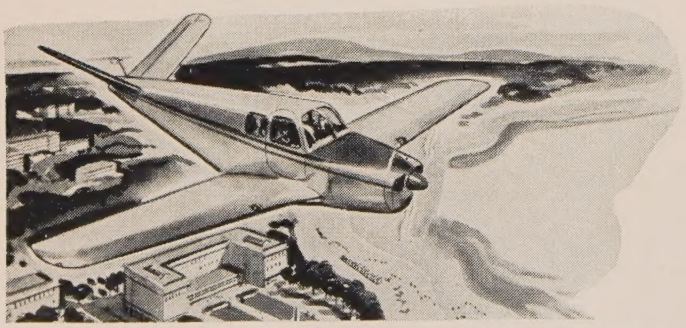

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SKYWAYS

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AIRviews

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Donald W. Douglas

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AIR YOUR VIEWS

Sportsman's Plane

Gentlemen:

I've just finished reading Mr. Stech's request for help in choosing an airplane, and I'd like to express my opinion for what it's worth. I go fishing by air and I think I know what Mr. Stech needs.

My choice is the Stinson. It carries a very good payload, cruises at 115 or better, will get out of a small field better than most lightplanes, and it handles better than any lightplane I've flown. The back seat can be removed and the space used for luggage. The operational cost of fabric is no more than a metal plane. Remember as fabric rots, metal corrodes. Perhaps the only objection to the Stinson is the cost . . . it's higher than those planes Mr. Stech mentioned.

My next choice is the Piper *Cruiser*. And once you've learned to overcome the floating tendency the ship has, you can land it in as small a field as the *Cub* trainer. Its upkeep is very little and it will perform right along with the best aircraft in the field.

For what Mr. Stech wants from a plane, he doesn't want a low-wing job. He'd have it in the repair shop half the time, getting holes patched up.

If Mr. Stech gets a Stinson, I'll envy him. I'm going fishing tomorrow and have to fly 100 miles. I'll do it in an hour and 30 minutes in a *Cub* trainer. He wouldn't have that kind of time in a Stinson.

I'm a flight instructor and operate a school for my company. I don't sell airplanes so I'm not interested in selling Mr. Stech anything. Tell him, though, that if he ever comes to Florida, look me up and we'll do some good Florida fishing.

BARNEY G. ROTH

St. Petersburg, Florida

Gentlemen:

I always evaluate lightplanes in terms of what they can do, how easy they are to maintain, and how they handle. In terms of what Mr. Stech wants from his plane I'd say the Cessna is it. That Cessna landing gear is an answer to a sportsman's prayer. To my way of thinking, the fabric fuselage is out for a sportsman's ship. Everytime you taxi through a litle rough stuff, you have a patch to put on, or certainly risk of it. The Luscombe 85 is a fine ship . . . and it has a metal wing. I've flown both the Luscombe and Cessna, and I think the Cessna has a slight edge.

With the Cessna's high wing, its good toe brakes, and maybe an Aeromatic prop for faster cruise and climb and shorter take-offs, it's a swell ship for a sportsman. It cruises over 110 and . . . he'll love it.

J. STARKEY

La Canada, California

These are two letters, representative of the many that have been sent to Mr. Stech by commercial and private pilots from all over the U. S. Our thanks to these generous airmen for their help in solving Mr. Stech's problem of what lightplane would be the best for a sportsman.—Ed.

F Quandry

Gentlemen:

After such planes as the TP-39, TP-40, TP-38 and the TP-51 you state in the July issue that the trainer version of the P-80 is the TF-80! Is this a misprint or am I all fouled up in my reasoning?

W. R. CORLISS

Detroit, Mich.

Not a misprint nor are you unreasonably fouled up. Actually the "T" stands for "Trainer" and the "F" for "Fighter." Under new official designations issued by the USAF, "F" is for Fighter; "R" for Reconnaissance; "T" for Trainer; "S" for Search and Rescue; "X" for Research; "A" or Amphibian; and "H" for Helicopter. Add to this "B" for Bomber. So—TF-80 designates "trainer" version of the "fighter" F-80.—Ed.

•

Long on Favor

Gentlemen:

The Colby article on "short on HP, Long on Fun," had plenty of meat in it. I think a small 50-hp two-place plane selling for $1,000 would be a shot in the arm to the small-plane industry. There are several air-minded fellows in this community who would be interested and able to buy a plane such as Colby suggests, but the price tags on today's personal planes are too high for us low-bracket flying enthusiasts.

"PISTOL" GREEN

Lodge Grass, Montana

The aircraft industry undoubtedly is doing everything it can, in the face to present conditions, to keep the cost of personal planes down. Some things, however, are beyond the builder's control. We believe, though, just as you do, Pistol, that a really lightplane without any trimmings and for a really low price would be just what the doctor'd order to re-inspire the flying public and give a shot in the arm to the market. We'll ask a manufacturer for you and see what he says.—Ed.

•

Duster Info

Gentlemen:

I am interested in the work of crop dusting, and really would like to participate in the work.

I know very little about how to begin, hence would appreciate any information you might be able to give me on such things as: type of plane to use, where to obtain that equipment, pilot requirements, etc.

JOHN H. ANDERSON

Easton, Maryland

We think you'll find that the article entitled "A Lesson In Dusting" and authored by crop-duster Arnold, in July issue gives most of the information you desire.—Ed.

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USAF NEWS

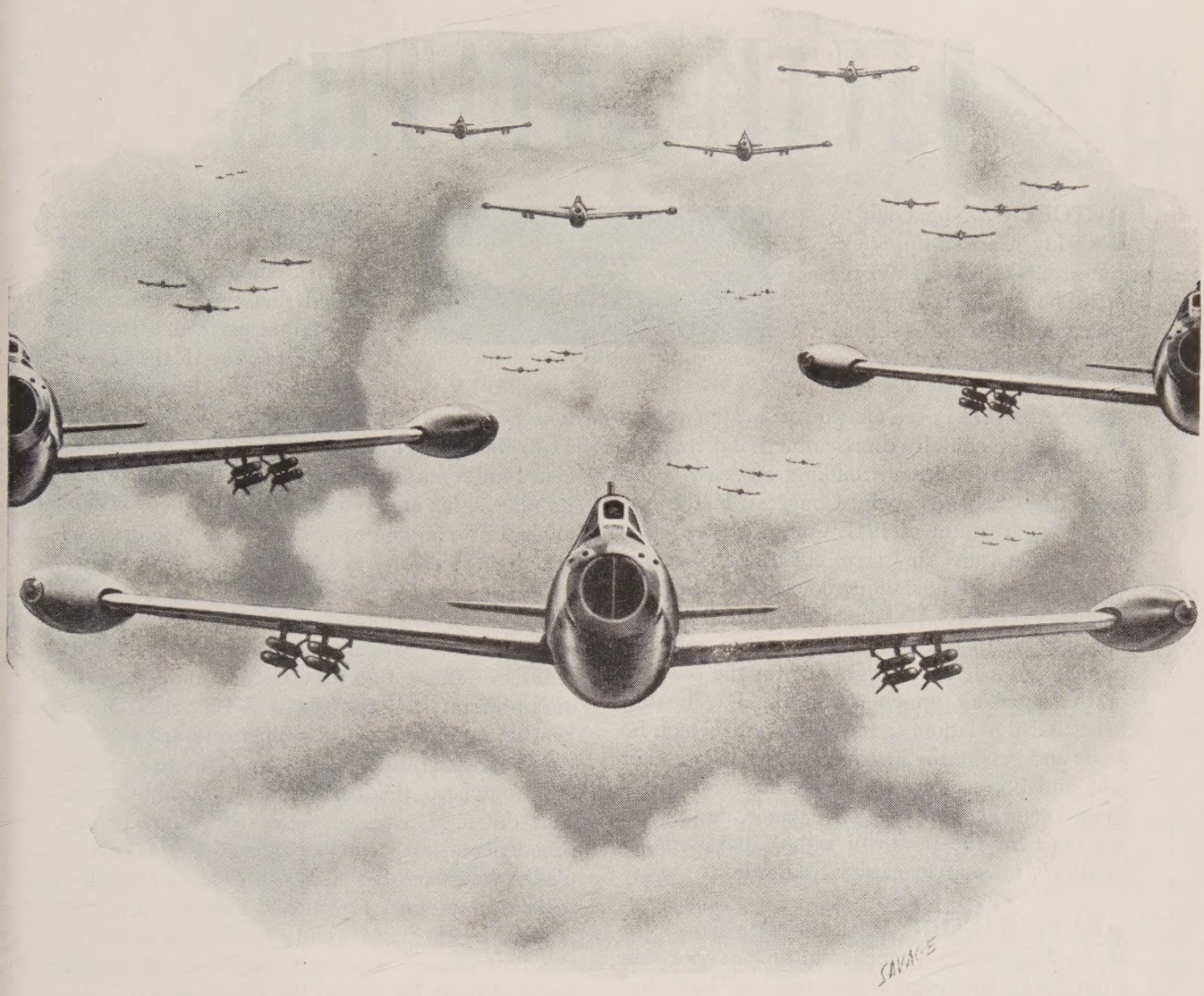
IMPORTANT news for Air National Guard officers is contained in a recent directive (AF Regulation 45-5) from USAF headquarters. This regulation outlines the personnel structure of the Air Reserve and established policies and standards for maintenance of proficiency by Air Reservists and Air National Guardsmen. The Air Force Reserve will consist of four branches: Organized Air Reserve, Volunteer Air Reserve, Inactive, and Honorary Air Reserve.

The *Organized Air Reserve* will consist of all personnel in the Air Reserve who are physically and professionally qualified for active duty, and who are assigned to a Reserve T/O&E unit or who have an "M-Day" assignment. Members of the OAR will be eligible for promotion, and priority in the expenditure of training funds will be given to this group. The *Volunteer Air Reserve* will be composed of Reservists who are physically and professionally qualified for active duty but who are not eligible for assignment in the OAR because of being over-age-in-grade or because of lack of vacancies in the OAR. Also, individuals who for personal reasons do not participate in the Reserve training program to the extent required for assignment to the OAR will be assigned to the VAR. The Volunteer Air Reserve has no limit as to size. The *Inactive Air Reserve* will be made up of personnel who do not maintain the proficiency required for either the OAR or the VAR. Officers in the IAR will be eligible for promotion and will not be assigned to this branch for a period in excess of five years. If at the end of such period an officer has failed to qualify for reassignment to the OAR or the VAR, his commission will be terminated; or, if qualified, may request transfer to the Honorary Air Reserve. The *Honorary Air Reserve* will be composed of Reservists whose service has been honorable and who have reached the maximum age-in-grade for service in the OAR or the VAR, provided that they have completed a total of 20 years of service in any component of the Army and/or the Air Force, and apply for transfer to this branch. Also officers who have become physically disqualified to perform the duties required by their grade may apply for transfer. HAR officers won't be eligible for promotion.

THE new regulation announces the establishment of a credit-system for officers of the Organized Air Reserve and the Air National Guard to determine maintenance of proficiency. Officers of the OAR and ANG will be required to obtain an average of 225 credits annually during each three-year period. Any officer who does not earn at least 675 credits in any period of three consecutive years will be considered to have not properly maintained his proficiency.

OFFICERS of Volunteer Air Reserve may accrue credits for promotion by obtaining 150 credits annually although they will not become eligible for promotion unless transferred to OAR.

Credits may be earned on the following basis: (1) For attendance at scheduled assemblies for instruction and training (maximum annual credit—250) — 5 credits will be awarded for attendance at each such assembly; (2) For attendance at 15-day field training exercises or maneuvers (maximum annual credit—150) — 150 credits will be awarded for attendance at and completion of each field training period or a pro rata share for completion of any part thereof; (3) For participation in tours of active duty or temporary duty, excluding field training, but including attendance at service school (maximum annual credit—250) — 24 credits will be awarded for each week of such duty or a pro rata share for completion of any part thereof; (4) For successful completion of extension course subcourses (maximum annual credit—260 credits). For each extension course subcourse successfully completed, the number of credits specified for such subcourse will be awarded; (5) For active participation in training or duty with troops to include flying, administrative duties, instructional duties, duty as a member of a court or board, and similar miscellaneous participation (maximum annual credit—250)—1 credit for each hour of such duty or training; 1 credit for each hour of preparation by instructor, but not to exceed three times the number of hours required for actual instruction; 1 credit for each hour of flying time recorded (AF Form 1) pursuant to training directives. Maximum daily credits—5.



PERFECTING ON SCIENCE...

When you see a jet propelled Air Force fighter or bomber plane speeding overhead . . . consider the time and effort taken to get it there. ¶ The REPUBLIC F-84 THUNDERJET first flew in February, 1946. Leading up to that important day, well over 500,000 engineering manhours were spent in putting together what was then known about the vexing problems of jet propulsion and high speed performance to create the first of these now-famous 600 mph jet fighters. ¶ Since then, several hundred Thunderjets have taken their place with various groups of the USAF . . . Another half-million engineering manhours have added greatly to the performance and utility of the F-84 . . . To keep abreast of changing operational techniques, more than 400 major design improvements have been made between the first prototype and today's F-84C. ¶ And that's not all. New jet developments, along with new experiences in actual Air Force operations, are expected to require at least 300,000 engineering manhours per year, in order that the THUNDERJET will consistently satisfy ground crews, pilots and commanders . . . maintaining its leadership among the modern planes assigned to guard our peace and security.

AIR POWER US A F IS PEACE POWER

"This Is the Year of the Thunderjet"

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NAVAL AVIATION

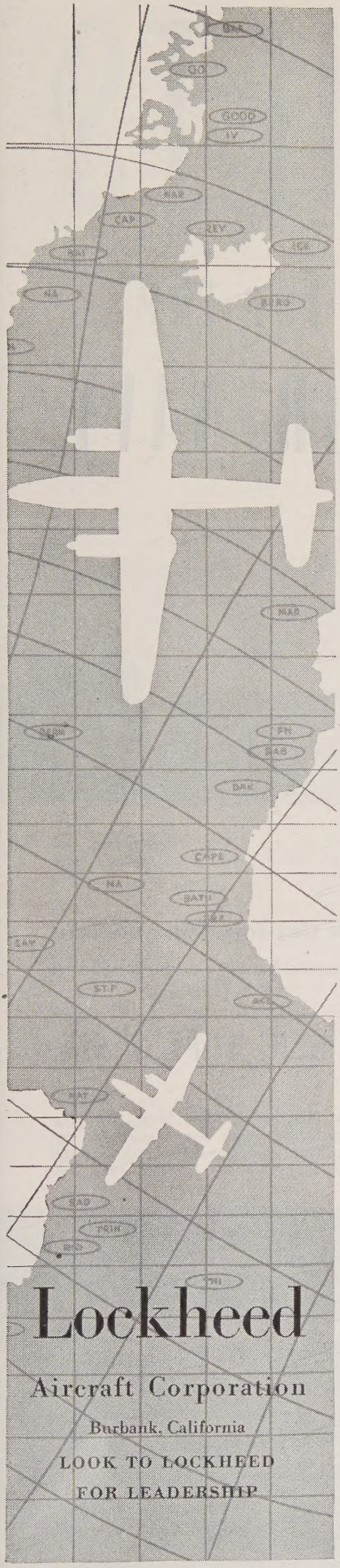
OCTOBER 27, birthday of Teddy "Carry a Big Stick" Roosevelt, is Navy Day. It's open house, and the Navy welcomes thousands aboard its ships and stations.

ON NAVY DAY, sea-air power's value to the nation is mentally disassembled and its parts carefully studied by all thinking citizens. Considered is the reason why Congress, in the National Security Act of 1947, unified the services, set up a separate Air Force, but also guaranteed the existence of an autonomous naval aviation. The reason is that Air Power, the prize fighter in our national defense, has two-fists—a right punch, and a left. The right fist for the purpose of the knockout punch is the USAF. The left fist is naval aviation. It is the one with which he leads and gets in the first punch. He delivers left jabs and hooks, throws punches from all directions, keeps his opponent off balance, and makes openings for the powerful right. That is naval aviation's mission in national defense.

SEA-AIRMANSHIP is the Navy's knack of landing surprise punches in quick succession from many unexpected directions to hurt and confuse an opponent. This special skill, closely akin to being in two places at once, results from sea-air power's move-ability. An eight-carrier task force can sneak up over the horizon, launch a devastating thousand-plane attack against a target at sea or on shore, and disappear again over the horizon. Within 24 hours that same eight-carrier force can move anywhere within a circle, the area of which is one million square miles, to launch another blow. Sea-airmanship and its move-ability take on a great significance when you take out your world globe and measuring string and find that 92 per cent of all targets of any importance in the world lie within 1,200 miles of salt water, and 100 per cent of the targets everywhere in the world lie within 1,500 miles of sea-air power's carrier-based aircraft.

THE vulnerability and sinkability of the carrier is considered. It is about as vulnerable as a porcupine with the speed of a rabbit in a dense forest. Its own defenses embodied in its umbrella of fighter planes and its accurate anti-aircraft guns shooting proximity-fused shells make this moving target pretty hard to hit. In World War II, the Navy's sea-air team had 110 of these carrier bases from which to fly. It lost 11 to the enemy. That's 10 per cent. Ninety per cent fought and survived. A base that can launch its planes, hit and run, and be anywhere within an area of a million square miles in 24 hours is as easy for the enemy to find as a needle in a haystack. Sure a carrier is vulnerable—a little—10 per cent worth. Find something that isn't vulnerable in a total war and you could sell a lot of real estate there. In total war one would be safer on an aircraft carrier than in Washington D. C., Seattle, or Detroit. How vulnerable are carrier-based aircraft? In World War II in the Pacific theatre where the carrier planes fought, they shot down 18 enemy planes for each carrier-based plane lost. Ninety per cent of the enemy planes were land-based. When one examines the facts, the picture is quite different from one painted by theorists. Teddy Roosevelt, father of the New Navy, was right when he imagined naval aircraft "of use in the event of war."

ON Navy Day, naval aviation is justified in bragging just a little. It has made tremendous progress since its early days. As an example there's the case of a record-breaking flight made by Lieutenant (now Admiral) J. H. Towers in October 1913. He set the world's sea-plane endurance record of 6 hours, 10 minutes, in a Curtiss pusher hydro-aeroplane. Fuel consumption—42 gallons! Now the Navy still holds the world's seaplane endurance record. It's 4,375 miles in 28 hours 25 minutes from Patuxent, Maryland, to Natal, Brazil, made by the "Old Lady" Martin *Mars* in November 1944. The Navy also has the world's long-distance non-stop flight record of 11,236 miles set by the P2V "Truculent Turtle" in October, 1946. The in-flight endurance record is also Navy's—170.3 hours without landing. This one was made by the XM-1 lighter-than-air ship. It took off October 27, Navy Day, 1946, and landed on November 3! Join the gang on Navy Day. You'll enjoy it.



PROP WASH

Aero Oddities

Major Catastrophe. During the war at an Advanced Instructor school in Texas, the AT-6 accident rate began to pile up, most of the accidents being inexcusable belly landings. Major in charge of training called group together, gave them stern lecture mixed with pleading, cussing, congratulating and berating. In midst of the talk, word came that another AT-6 had made belly landing at auxiliary field. Major fussed, fumed, dashed to hangar, flew over to auxiliary field to scene of accident and came in . . . wheels up! *(L. A. Berg, Bayport, Minnesota)*

A La Carte. Chicago's Leo Knoerzer promised his wife and two children he'd take them to dinner at the airport where they could watch airliners landing and taking off. When they reached field, however, Knoerzer felt line waiting to get into restaurant was too long. He bought round trip tickets to Detroit, family had lunch on plane enroute, dinner aboard plane on return trip. "Food" bill for family was $111.00. (*Harold Helfer, Arlington, Virginia*)

Float Area. During the spring floods along Ohio River, high waters inundated landing area at Cincinnati's Lunken Airport. Pilot enroute to another airport reported his position to Cincinnati radio as being on southwest leg of radio range "over sunken Lunken." *(G. H. Knox, Indianapolis, Indiana)*

Come and Get It. Student pilot on his first cross-country trip missed one of the airports on his route. Spotting a field next to a body of water, student pilot landed, asked where he was and how to get to Pulaski Airport. Attendant told him and student took off again, did a 180 and headed south. Few minutes later spotted water and came down second time to get directions. Attendant thanking it was a gag told student water was Gulf of Mexico, and airport was Mobile, Ala. Student pilot angrily phoned his instructor at home field, told him if he wanted to see his ship again to come and get it, then walked away. *(C. Ensley, Old Hickory, Tenn.)*

Direct Hit. A fisherman, annoyed by the sound of an airplane flying low over the region to spray DDT, tossed a beer can at the ship, downed it when can struck plane's prop damaging it. *(Buzz Hershfield, Kansas City, Mo.)*

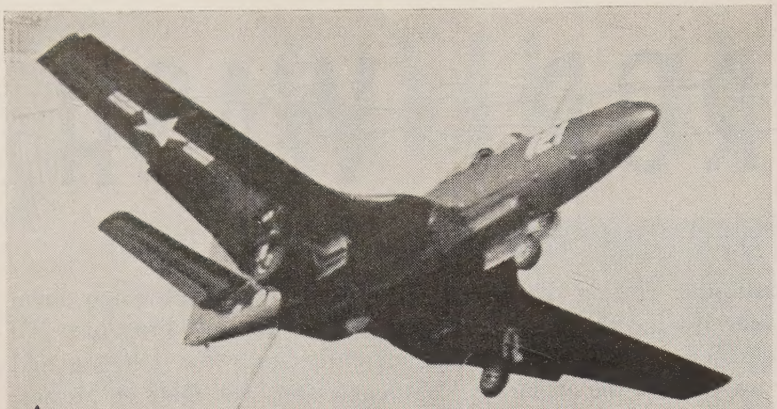
Walled In. Aeronca dealer Tacker and friend, on cross-country trip, could not locate destination airport because it was under flood waters. With gas getting low and darkness approaching, Tacker landed in open field near town. When men in striped clothes greeted them, Tacker realized he'd landed the ship within confines of the Tennessee State Prison. *(H. Tacker, Oxford, Miss.)*

Dry Run. Ex-Army pilot, now farmer, borrowed crop duster's plane so he could dust his own fields. Took off from airport, flew to his fields, then discovered dust bin empty. Looking back he discovered he'd dusted countryside on way over. *(R. K. Doyle, Gainesville, Fla.)*

Att'n Readers:

If you have any news note oddities pertaining to aviation, send them to SKYWAYS, Box 17, 444 Madison Avenue, New York 22, N. Y. Five dollars will be paid the sender of each "oddity" printed. Contributions cannot be returned unless accompanied by stamped addressed envelope. The decision of the editors is final.

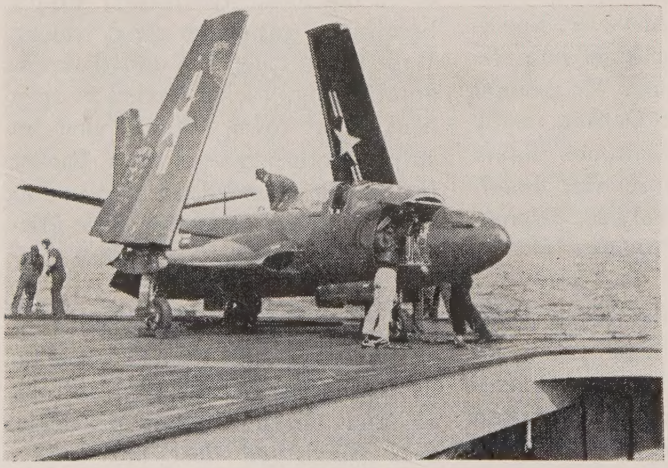
JETS for the AIR NAVY



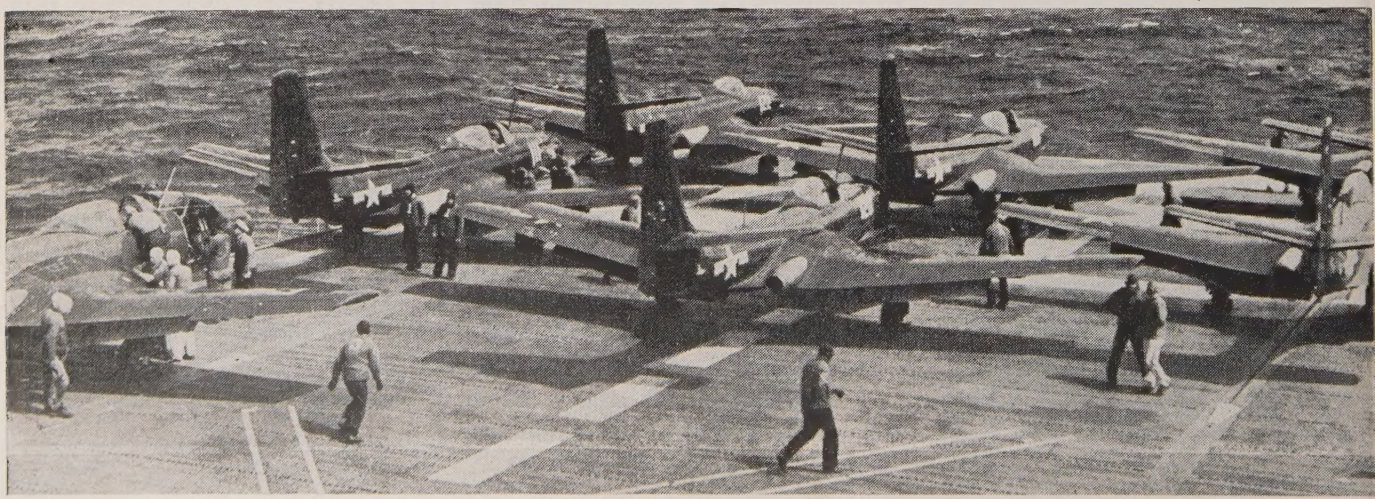
CARRIER TEST proved jets could take wave-off and get away fast, as this VF-17-A Phantom demonstrates here

Navy jets pass flat-top test and join ranks as regulars aboard our carriers

By Lt. Cmdr. W. H. HUFF, U.S.N.



RE-ARMING jet ships (left) is easier than re-arming guns of F6F's. No trucks or stands are needed to get ammo into its tracks. Man can stand on deck and fill ammo boxes. Visibility of jets makes spotting easy, too



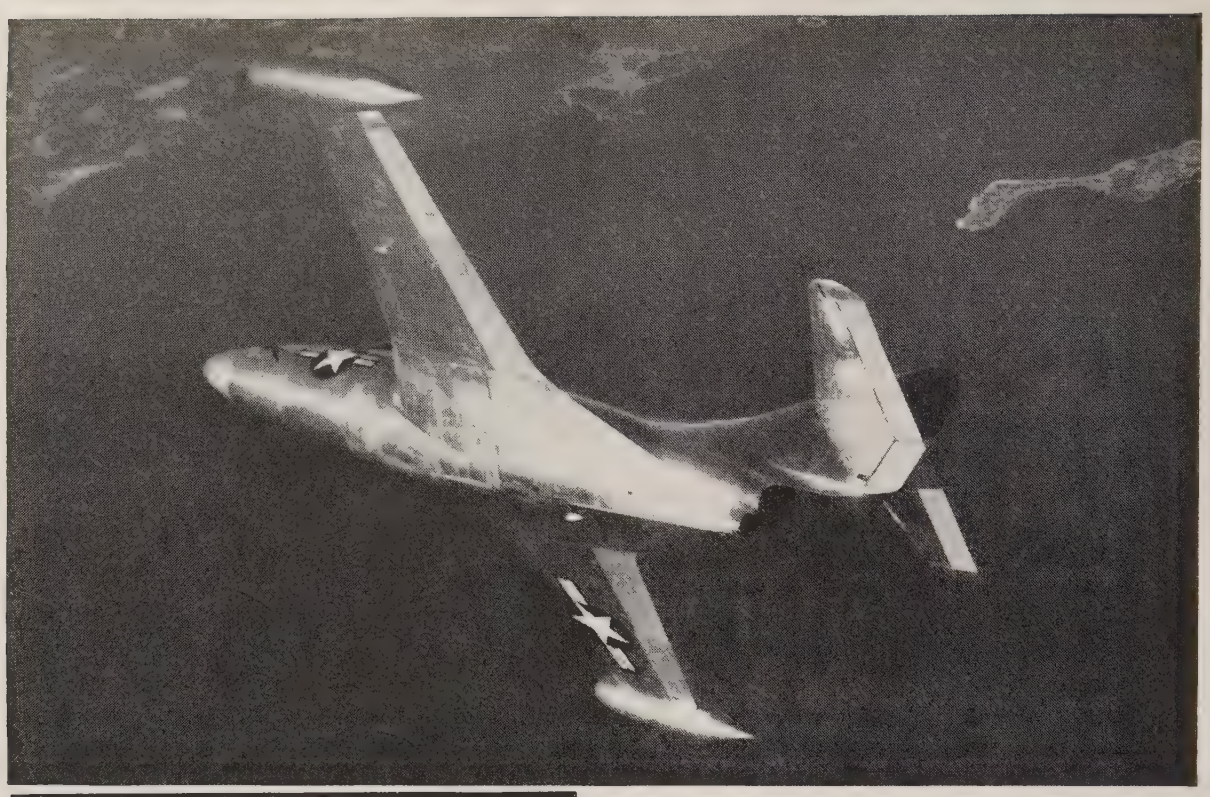
ON 11 MAY, 1948 a radioman at Quonset Point Naval Air Station received the following message: "Mission successfully completed. Sixteen planes VF-17A returning to base." The radio message came from one of the Navy's smaller working carriers, the *USS Saipan*. In essence it reported that Fighting 17 Able, the Navy's first operational jet squadron, had completed three days of full-scale carrier operations. And it applied the stamp "approved" to jets at sea. They were now ready to take their proper place as active units of the fleet.

Even before the war ended, the fighter section of the Navy's Bureau of Aeronautics had taken the jet road and quietly went about burning the bridges to the rear. At that time jet propulsion was still new and news, and still untried. However, some performance figures were available; German, English and a few American jets were flying. The decision was easy. Comparative figures on jet and propeller aircraft performance put the handwriting in plain view.

So, reciprocating-fighter development dropped out of the Number One pigeonhole for action, and jet-fighter design filled the space. But even while the bridges blazed behind, bigger and better ones loomed ahead. The big question: Would the new thoroughbred break to harness? Could the jets be adapted to carrier use? The new steed performed brilliantly on the race track, but on the milk route would it deliver? Of course it could and would, but the time element was important, how long would it take to solve the problems? Matter of fact, what *were* the problems?

Wary aviation experts were as hard to corner as Notre Dame's football coach. When questioned, they pointed out a multitude of problems.

NAVY'S NEW JET, the North American FJ-1, passed its tests on board the carrier Boxer. Two FJ-1's were used for this try, later on experiments will be made by full squadron. Short take-off seems to pose no problem



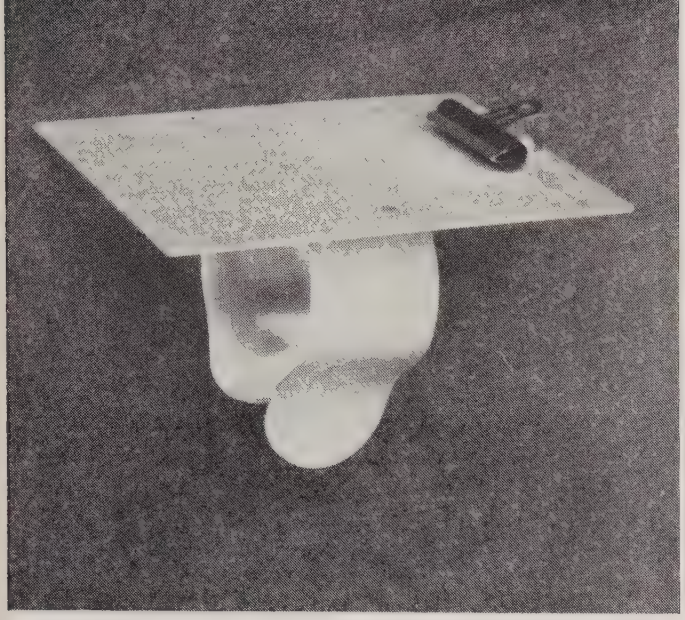
ANOTHER JET fighter plane designed specifically for carrier operations is the new Grumman F9F-2 Panther

USS SAIPAN was scene of catapult test with Phantom (below). Note length of hold-back cable required on tricycle-gear plane. Double cable extending forward is catapult bridle. Shot (above) is of North American Fury on take-off

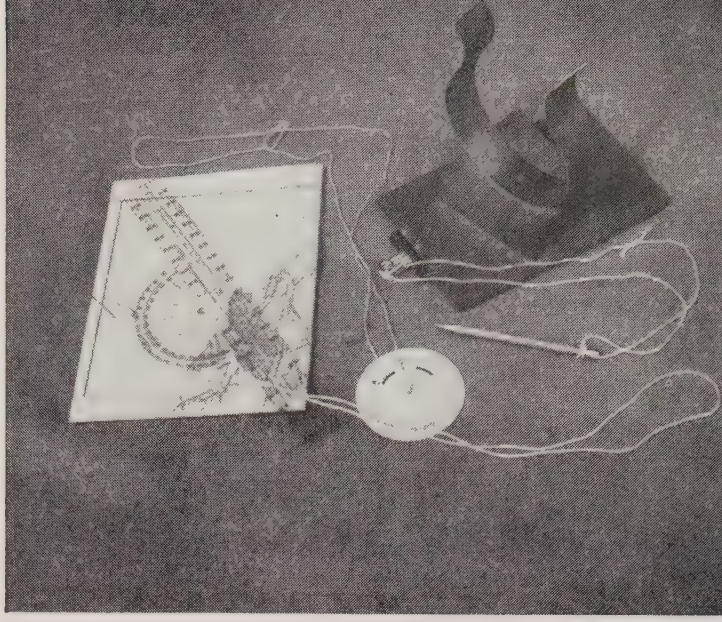
Acceleration of the jet-powered plane was notoriously slow and a carrier deck was short. The new jet design would have to be sleekly streamlined. For maximum speeds, minimum wing area and wing thicknesses. This meant a reduction in lift at low speeds—carrier landings are always made at minimal speeds. Deck-end speeds would always be slow. There was the fiery exhaust and nauseating fumes that had to be contended with. Deck personnel would have to work around the plane at close quarters. The carrier hook had to be manually released and the hot tailpipe would be an additional hazard. "Oh yes, jet propulsion was great, but . . . ."

The Navy sent a questionnaire around to various technical desks requesting ideas on anticipated problems and possible solutions. A small library was collected on reasons why conversion to jets would be tough.

High fuel consumption during taxiing and the fiery exhaust might preclude deck taxiing. More and faster tractors would clutter up the deck, perhaps a conveyor belt to move the planes would be required. Logistics would be more complex because jets required special fuel. A barrier crash might shave off the pilot's head because he had no engine up front to absorb the shock and stop the barrier wire. The jet blast might burn the paint *(Continued on page 41)*



TOOLS of the trade for the solo navigator in his personal plane include a knee clipboard as a writing back



STRING, to which navigation equipment: map, plotter, etc., is attached, prevents pilot from losing articles

Navigating Solo

By ALICE S. FUCHS

HAVE you ever found yourself at 2,000 feet on a gusty day trying to keep your plane on the right heading for a cross-country trip while at the same time you were juggling pencil, paper, map, and other equipment necessary for dead-reckoning navigation? Have you ever scrambled around to find that computer you dropped into the no-man's land under your seat, meanwhile wondering when your compass was last swung and what the name of that town was that appeared so unexpectedly just off your left wing? Chances are you decided that scientific navigation was all right as theory in the classroom, but wasn't practical in the air, at least not when you had to fly and navigate too.

Let's be realistic about this matter of lightplane navigation. The average lightplane—that is, a 50- or 65-hp model—has not had its compass swung recently; it does not have a driftmeter, a radio or a sensitive altimeter; it lacks much of the equipment that is taken for granted by navigation textbooks. Regrettable as these deficiencies are, they are very real and must be taken into account when thinking of lightplane navigation.

Compared with larger and higher powered airplanes, the 65-hp ship flies at a comparatively *low* altitude (under 5000 feet) where there is maximum turbulance (and maximum difficulty in holding a course by magnetic compass without a directional gyro) and where there is the greatest amount of haze; it flies *slow,* so that of all airplanes it receives the greatest relative effect from wind. Flying at low altitudes, the pilot lacks the advantage of a wide *(Continued on page 42)*

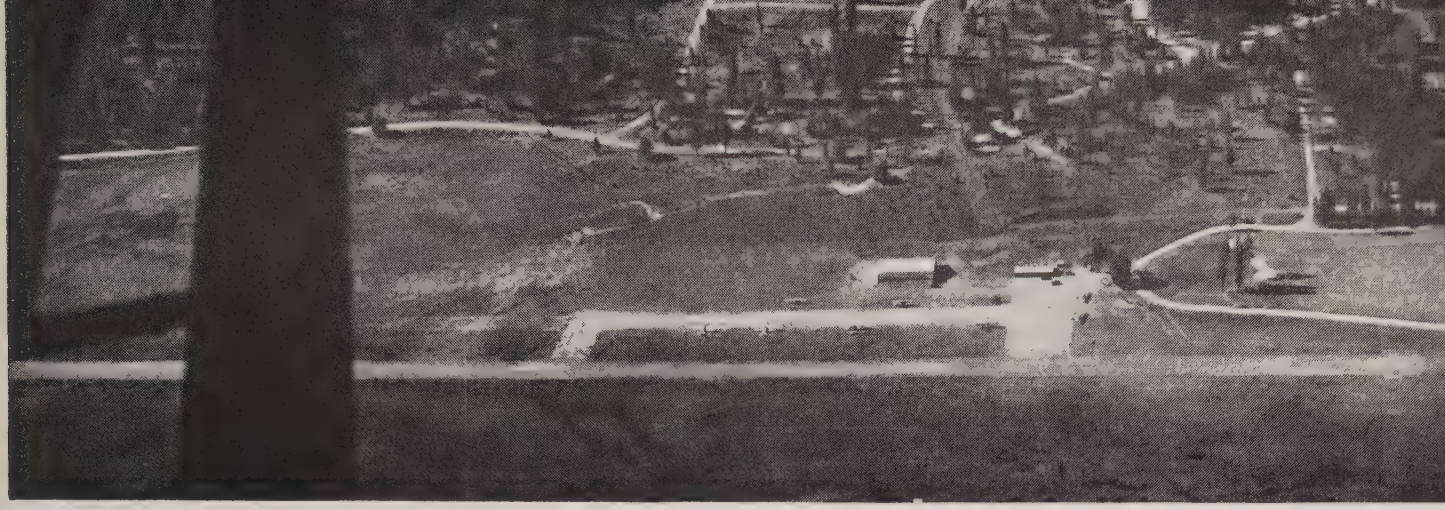
CLIPBOARD, with pencil attached, clips to pilot-navigator's knee. This helps keep the "log" off plane floor

Pilot's Report...

Piper FAMILY CRUISER

CRUISER was flown to Big Bear Lake (above) for tests at Southern California's highest commercial airport

FOUR-PLACER carried 640 pounds of passengers and pilot (below), plus another 25 pounds of camera equipment



AIRPORT at Big Bear Lake is built on a meadow between Big Bear Lake and Baldwin Lake. The strip is at an altitude of 6,850 feet above sea level. Harry Martin (below right), Cub distributor, okayed this testing area

Test hop to Big Bear proves new four-place Family Cruiser excellent ship

By DON DOWNIE

This is the fourth in an impartial series of pilot-report features on current family airplanes.

THE NEW Cub *Family Cruiser* can't help but be a popular airplane.

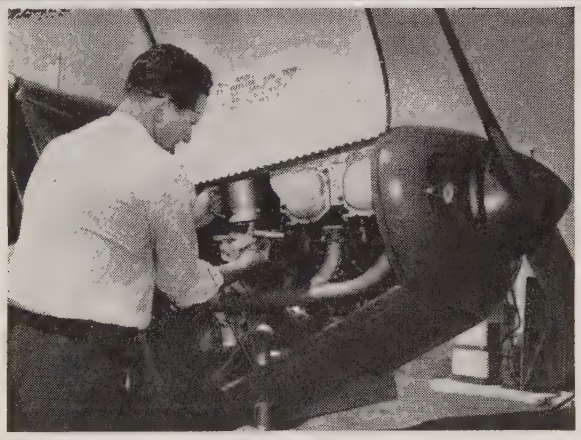
This four-place *Cub* is the same old three-place *Cruiser*—only it's come of age and now carries four.

From a distance, it is almost impossible to tell any difference between the three-place *Cruiser*, now out of production, and the new PA-14 *Family Cruiser*. The four-place has flaps, is seven and a half inches wider at the front pit and has a new rust-and-ivory paint job. Under the hood an additional 15 horsepower have been added to the four-cylinder Lycoming engine—and that's about all.

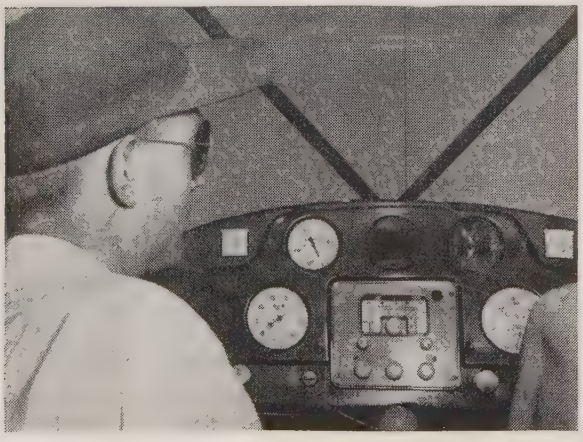
By far the lowest priced of the current four-place planes, this new *Cub* presents an interest-

FIRST take-off from field was made solo in 11 seconds. Photo here shows author coming in after that first try

TAKE-OFF roll on the second take-off test, with two aboard, was just 100 feet longer than first solo run



FAMILY CRUISER'S Lycoming engine performed beautifully during testing. At high altitude, best performance was with mixture well leaned out. Photo (below) shows 2425 rpm, 90 mph at 6,000 feet in a full-throttle climb



ing approach to the problem of lightplane flying. It weighs only 1,000 pounds empty and is licensed to carry an additional 850 pounds. You can put in what you wish; fuel, passengers or cargo. If you fly with both 17½-gallon wing tanks full, that's 210 pounds, you have 640 remaining for pilot, passengers and baggage. The back of the rear seat pulls out for easy access to the roomy baggage compartment on the ground and nearly 500 pounds of freight may be spread around the cabin for solo flying.

The plane flown in this pilot-report article was the original production model to leave the Lockhaven factory. Harvey Martin, California and Nevada Piper distributor, received delivery of the first four-place off the assembly line by winning a 60-day *Cub* distributor's contest in selling 13 new *Vagabonds* (the little two-place job). NC 4200H had nearly 200 rough-and-rugged demonstration hours in the log books before it was flown for this SKYWAYS feature, but it showed little sign of wear and tear.

While it never rains *(Continued on page 44)*

FEATURE of new four-placer is its built-in tie-down rings, accessible by removing inspection plate in wing spar

FLIGHT SHOT of the Republic F-84 shows its rockets mounted under the wings. Note machine guns in nose above intake

ROCKET-FIRING JET

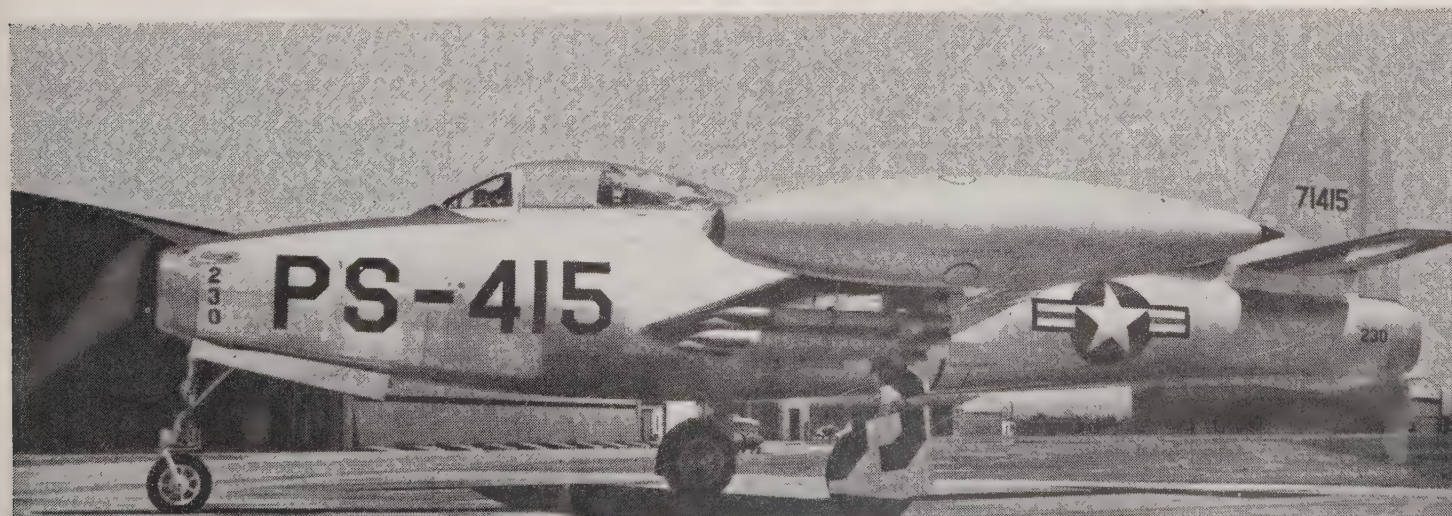
MORE danger than ever (to a potential enemy, of course) now lurks within the slender wings of the powerful USAF F-84 *Thunderjet*. The striking power of the F-84 recently was increased by the addition of eight HVAR (high velocity aircraft rockets) to its normal operational equipment of six M-3 type .50-cal. guns.

The rockets, each weighing 140 pounds, are mounted in pairs under the wings, but are fired individually by the pilot. After the projectile has been fired, the rocket mount retracts automatically into the wing. This makes it possible for the pilot to get top speed out of the ship for combat, and it eliminates speed-reducing obstructions under the wings, such as the exterior-mounted, fixed-position racks formerly used.

Tests with an F-84 firing rockets in high-speed flight were made in Aberdeen, Maryland. The rockets have a velocity of 950 mph.

HVAR ROCKETS weigh 140 lbs. each, have a velocity of 1400 feet per second

USAF has ordered 1,000 F-84's, about 25 per cent of which have already been delivered and put into operational service



Fly by Omni-Range

By GIL QUINBY

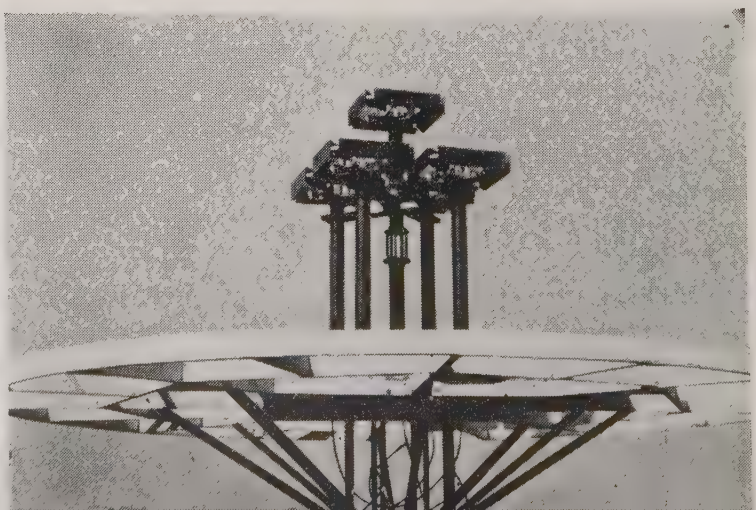
GROUND STATION of a VHF transmitter (below) broadcasts a VHF signal which is dependable for a maximum range of 100 miles at high flight altitude. Signal is picked up via coaxial "V" antenna (above) like this on DC-3

THE CAA has given the omni-range an official name: VOR, for visual omni-directional range. This nomenclature is the tip-off on just what the omni does and how a pilot can use it in cross-country navigation. "Visual" indicates that the omni, like all good children, is seen, and not heard. Instead of finding your course with your ears by listening to A's & N's, your navigation information is presented on a visual indicator. "Omni-directional" means "in all directions"—not merely four courses as in the familiar A-N range.

Without wasting a lot of technical double-talk that could be boring, let's examine the range station itself before we turn to the instrumentation in the airplane. The range station broadcasts a VHF signal which is dependable within line of sight of the station, and for a maximum range of over 100 miles at high flight altitudes. This signal is broadcast in three parts: call them reference, variable, and identification. There is a difference in the electrical characteristic of the reference and the variable signals that is proportional to the direction in which they are broadcast.

Back up and look at that again—if you understand this part, the rest is easy. There is a difference in the electrical characteristic of the reference and variable signals proportional to the direction in which they are broadcast. If we have a receiver that is due north (magnetic) of the omni-range station, this receiver will re-

VHF Omni antenna is shown here on counterpoise. This antenna sends out on airways its particular VHF signal

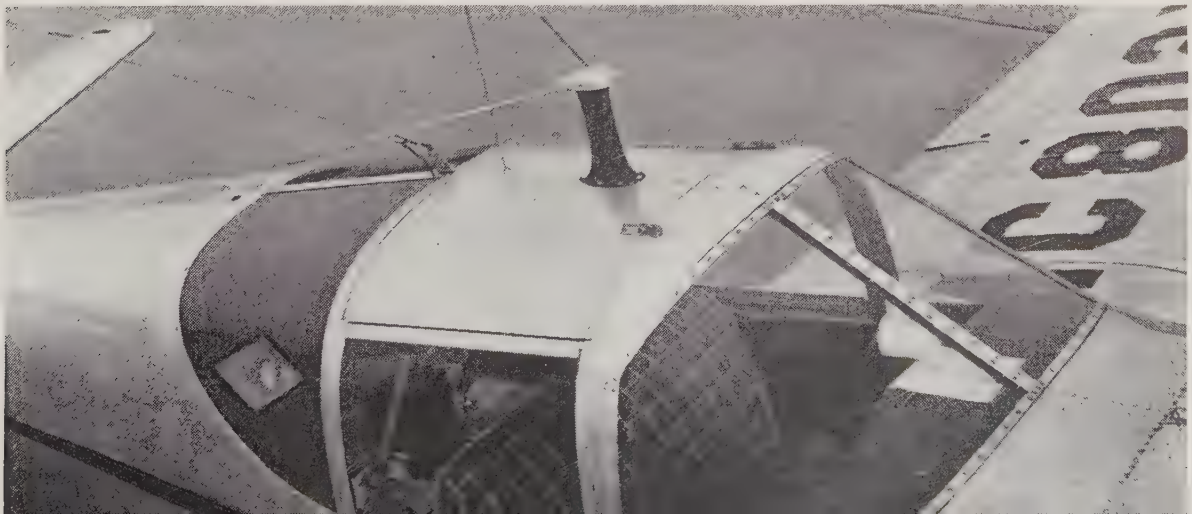


INSTRUMENT PANEL on DC-3 is a busy one, but directly in the center, behind throttles, is ship's VHF equipment

ceive the reference and variable signals in step with each other, or "in phase". If the receiver is south of the station, the reference and variable signals will be exactly out of step, or 180 electrical degrees out of phase. It's the same way all around the station—East of the station the two signals will be 90 degrees out of phase. And at a bearing of 243 degrees magnetic from the station, the phase difference between the two signals will be 243 degrees.

The coded identification signal is broadcast all the time and in all directions with admirable simplicity and impartiality. It' says "TOL' (- --- .-..) for To- *(Continued on page 48)*

VHF ANTENNAE have been developed for lightplanes, too. This "V" type of antenna is shown mounted on a Temco Swift. While VHF radios are not cheap today, they cost less than they used to and probably will come down more



PIPER CUB with its side wired open is good ship for pix taking. Photog sits in rear seat

Photo Flight

By DONALD CHASE

AERIAL CAMERAMAN took this picture of plant destroyed by explosion (dark area in center) after roads into area were closed by police

PICTURE with good selling possibilities is of first snowfall, like this one made by an aerial photographer from a Waco

PILOT of this Cub picture-plane forgot to turn on carburetor heat, so the engine quit. Result—plane cracked up

SO YOUR friend with the Box Brownie or the new Speed Graphic wants you to fly him for some air pictures?

Sounds easy—but is it?

As in any specialized type of flying, there are many tricks of the trade in piloting for cameramen. When flying a camera ship, the pilot determines the angle of the picture and the photographer must shoot it on the way by. If the pilot is on the ball, the photographer's job is a cinch. If he isn't, the bill for flying time will run into money.

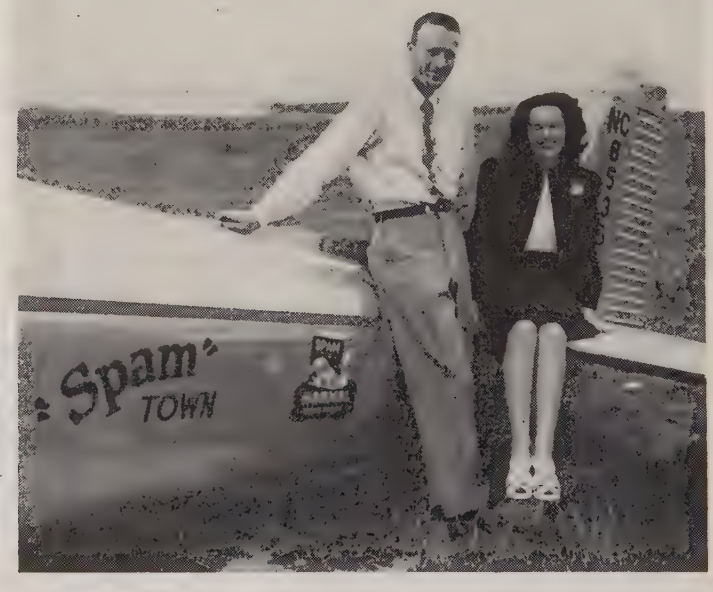
If there is a choice of aircraft, by all means take a standard *Cub* trainer with mufflers, unless the trip is far over 100 miles. With the wide horizontal doors wired open, this little yellow trainer is the easiest airplane in the world from which to take either still or motion pictures.

Should there be no *Cubs* available, many other lightplanes are *(Continued on page 52)*

AERIAL VIEW of a forestry look-out tower in San Bernardino mountains was made from a new Cub Family Cruiser. Cameraman took the picture through an open window late in the afternoon. For safety's sake, the photographer had all his equipment securely fastened to him so that camera could not be lost out plane window in rough air

PILOT-AUTHOR Glenn Hovland was a fighter pilot during World War II. Today, however, he flies the Ryan Navion

PLANE serves as transportation to gold mine owned by Wesemen and Enger (right) shown here with miner and son



PILOT HOVLAND last summer flew Marjorie Shaw, chosen "Queen of Austin," to the Aquatennial in Minneapolis

BOSS of "Spam Town" and its owner is Chester A. Weseman (wearing hat) who uses ship for business, pleasure

Flying CHAUFFEUR

By GLENN L. HOVLAND

EXECUTIVE NAVION has flown over mountains, across prairies and over nearly all of Minnesota's 10,000 lakes. A recent emergency trip to the mine saw the busy airplane fly over 3,000 miles, from Texas to Nevada, in two days

LANDING FIELD for the ship, on its emergency trip to the mine, was a salt flat at Jungo, 30 miles from mine. Damaged impeller pump was hauled to plane by a truck, loaded aboard the Navion and flown to Reno for repairs

THE life of a limousine driver may be boring, with its usually uneventful trips and long periods of waiting between them, but a "flying chauffeur" rarely has a dull moment. Of if he has, maybe I've been lucky, for I've never had to go out of my way for excitement from the time I hired out as personal pilot to Chester A. Weseman, of Austin, Minnesota, whose varied interests have kept me and "Spam Town" on the jump constantly.

"Spam Town" is the four-place *Navion* which Mr. Weseman calls on for an emergency business assignment at any hour of the day or night. Or, he may suddenly decide that he needs relaxation from his arduous tasks by going fishing 325 miles away from Austin, *(Continued on page 50)*

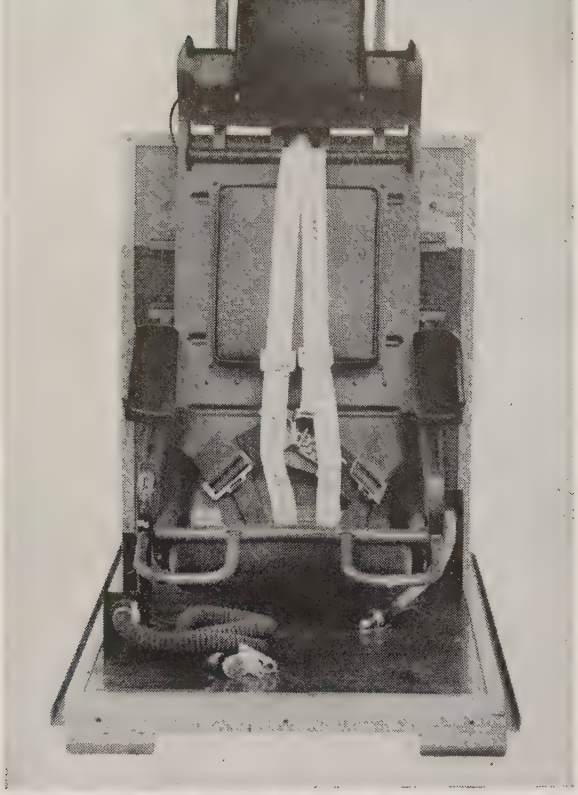
TRIP back to mine with repaired pump was made next day. Hovland landed Navion on dirt road near the gold mine

SHOULDER

By JOHN P. JEFFERSON

LARGO, MD., MARCH 25.–(UP)–An Air Force F-80 jet fighter plane crashed near here today but the pilot, Lt. Paul York, of Charleston, Ill., walked away from the wreckage with only two minor cuts.

The "Shooting Star," which normally cruises at about 600 miles an hour, crashed through the tops of trees and the branches tore off its wings.



SHOULDER HARNESS arrangement (left) is installed on an ejector seat for the Air Force's F-84 Thunderjet fighter

PILOT of this crashed F-80, Lt. York (shown sitting this one out) was uninjured though plane was demolished

The fuselage hit the ground and skidded for about 400 feet before coming to a stop.

Witnesses said the plane was "literally blown to pieces" by the force of the impact.

Officials at Andrews Field, Md., where the plane was based, attributed York's escape to the fact that he was harnessed into his seat.

York's only comment was the terse report that he was cruising at high altitude when the plane was "forced down." No immediate explanation of the trouble was given.

CLOSE-UP of shoulder harness arrangement shows how harness strap fits into the tongue of the seat belt buckle

HARNESS . . . A MUST

MANY SKYWAYS readers undoubtedly read this story when it appeared in the papers a few months ago. The fact the pilot survived the crash seems miraculous when you look at pictures of the F-80 after it came to rest. More amazing is that Lieutenant York received only two minor cuts—one on the left side of his chin, and the other on the back of his hand, presumably as he climbed out of the jagged, shattered canopy.

Like most news stories, the facts that were not told are even more interesting, especially

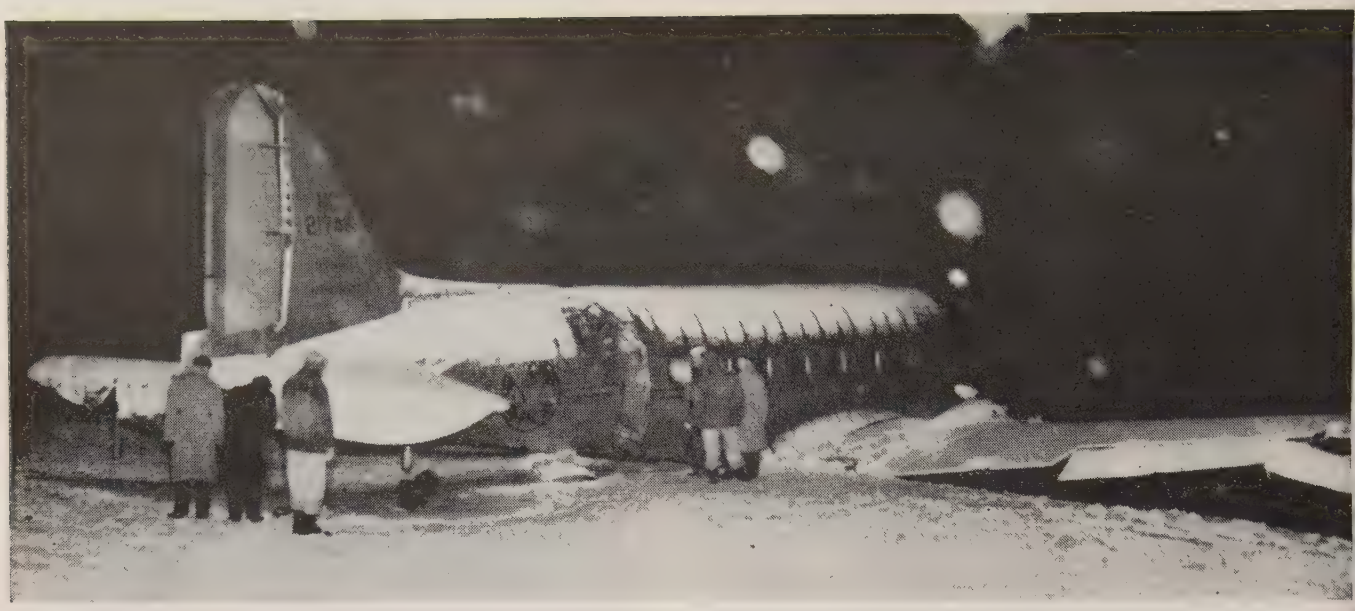
NAT'L GUARD pilot (right) demonstrates how shoulder harness in F-47 prevents forward movement when it's locked

LIGHTPLANE crash doesn't look severe, yet passenger was killed because he failed to fasten his seat belt

when compared with the data that's been gathered by Crash Injury Research—a project sponsored by the National Research Council. Thanks to its genial director, Hugh De Haven (the driving force behind Crash Injury Research), we're learning how to make flying safer by tackling crash problems.

Small modern planes are safe and easy to fly, but pilots still get into trouble. And when trouble comes, we know now that much can be done to prevent injuries. *(Continued on page 54)*

SAFETY GEAR in the Nat'l Guard's F-47 includes shoulder harness, safety belt equipment, plus crash helmet



STATIC ELECTRICITY that knocked out this airliner's radio was given as the main cause of its emergency landing. The airliner, on its way to La Guardia Field during a snow storm, made its crash landing at Jones Beach

Problem of Air Safety

ELECTROSTATICS was suggested as the cause of this mishap in Florida. Propeller blew off the inboard engine

By ROBIN BEACH

AIR safety has suffered indirectly since the war because decreasing revenues have forced aircraft manufacturers and commercial airlines to retrench and this has resulted in research and engineering staffs being cut to minimum levels. Increased dependence on military research organizations, in many cases, was expected to make up any deficiencies.

In one particular segment of safety engineering—the control of electrostatic hazards—dependence solely on military research for guidance has led commercial aviation into a danger-

SPARKS, the result of electrostatic discharge, caused the pitting of surface of this bronze propeller cone

ous blind alley. As a result, outstanding hazards to safe flying, whether it be private, commercial or military, are old ones—among which are the following:

1) Radio blackouts still occur on aircraft.
2) Radio navigation instruments still fail.
3) Airplane engines are susceptible to mid-air explosions.
4) Planes are subject to borderline accident "mysteries."

These dangers are usually the result of rampant electrostatic generation on and uncontrolled discharge from airplanes; conditions that are rapidly becoming worse with each advance in the speed range of newer and faster aircraft. No practical means are available for reducing the generation of static electricity on airplanes in flight; but quiet discharge of high voltages, eliminating radio disturbances and other troubles, can be accomplished by the use of properly applied ionizers.

During the war a joint Army-Navy precipitation-Static Project at Minneapolis developed a "dry wick" electrostatic dissipator which was subsequently adopted as an Army-Navy standard for military aircraft and was also installed on commercial aircraft. These are the familiar "cords" attached to the trailing edges of flight surfaces.

Despite an array of later proof regarding the futility of the AN/ASA dry wicks as electrostatic dissipators, they continue to be used. Practical evidence demonstrates that these dry wicks are not only ineffective, but that their continued use may be dangerous, notwithstanding the opinions of several so-called military "experts."

Where the dry wick is still found in airlines service, usually the discharge end of the flobs, which should project about one inch beyond the plastic sleeve, has been dissipated to the extent that only the stubby end of the plastic covering shows. Even when the ends are properly trimmed, the adhering silver salts, in which cotton floss is dunked during manufacture, soon wash off, thereby causing an open circuit insofar as permitting any ionizing discharge to occur at their ends.

Although the resistance of the wick from end to end is required to be about one megohm according to AN specifications, the author has found by measuring several hundreds of them, that about 95 percent possess, on the average, resistance values in the order of several hundred to many thousands of megohms. Obviously, their ionizing properties under these inhibiting conditions are nil.

Apparently, the group engaged in the costly three-year military electrostatic project which developed the wick never conducted aging tests on their product to discover whether its discharge facilities, under flight conditions, displayed vagaries of behavior different from laboratory operation over a period of time.

After independent investigations disclosed the futility of the wicks, we're forced to conclude that the airlines which continue to use them display them merely as false tokens of alleged safety to satisfy inspecting agencies.

Since the publication of the results of the author's tests on electrostatic dissipation (April and May, 1947 *Electrical* *(Continued on page 39)*

CLOSE-UP photo shows how propeller ionizers are attached to the propeller blades in the test installation

PINT-SIZE RACER

DESIGNED for aerobatics, the Pitts Special has 16-foot wing span, is 14 feet long, and has 152-mph top speed

BUILDER and designer of the famed Pitts Specials is Curtiss Pitts, shown here with his Number 2 version

SECOND ship that Pitts built when he was boy was this single-seater that was powered by Zekely engine

Curtiss Pitts designs and builds a tiny racer that's a pilot's dream

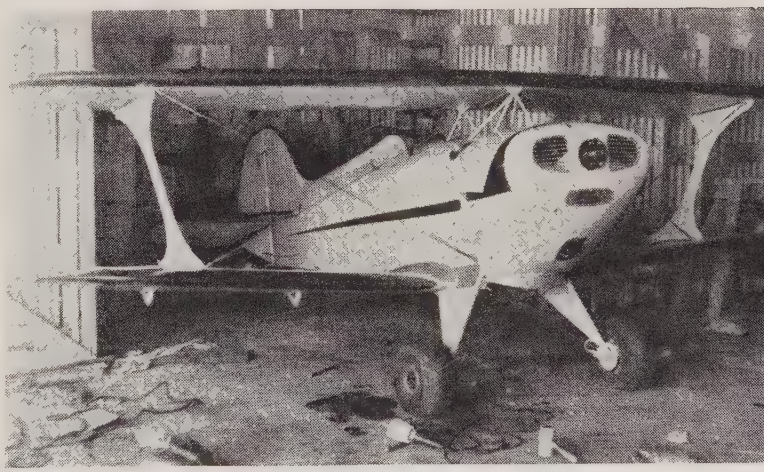
By S. B. JONES

LAST summer at Orlando, Florida, a tiny airplane made its debut at an air show. The plane's pilot was P. C. Quigley, as much of a newcomer to air shows as the plane itself. If you can imagine a 200-mph whine from an 85-hp engine, if you can picture a flash-by of vermillion and cream, and then a cloud of dust, you'll have some idea of the grand entrance this ship made at that air show. And the act which followed set the thousands of spectators to competing with the airplane in providing the roar.

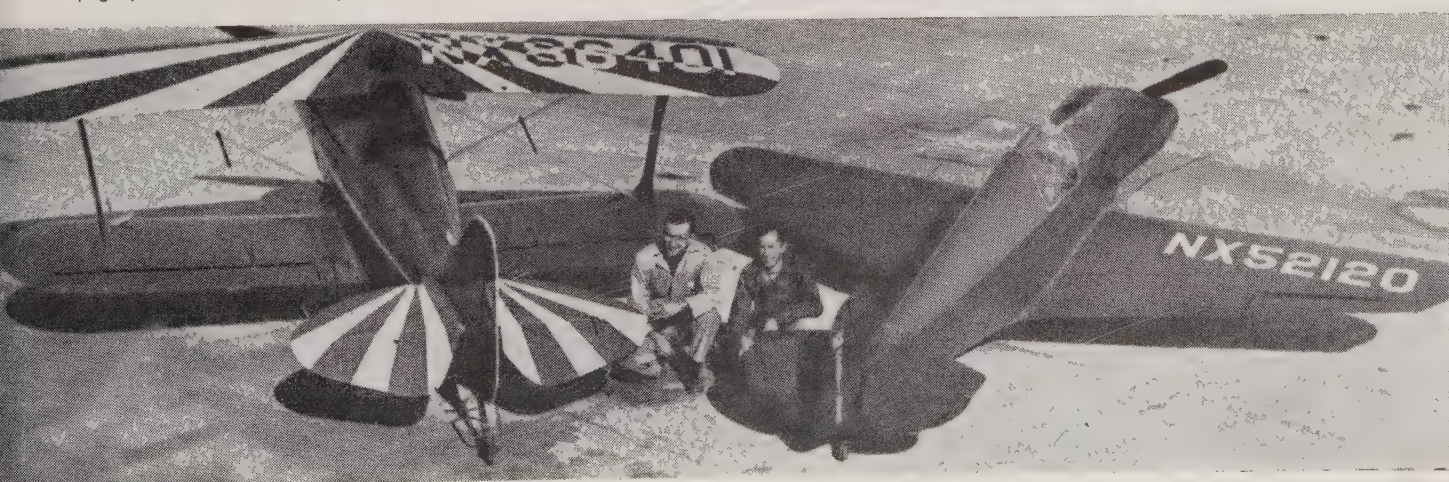
Designer and builder of this remarkable little airplane called the "Pitts Special" . . . or "Jeep," was Curtiss Pitts, owner and operator of an aircraft repair shop and an aircraft and engine mechanics school. Airplanes are no unknown quantity to Curtiss Pitts. He built his first airplane at his Georgia farm home when he was 15 years old. It was powered by an engine taken from a Model T Ford . . . an engine that was subsequently returned to the Ford because the airplane surprised its youthful builder and actually left the ground!

The second airplane Pitts built also flew, but this time there was no surprise element. Pitts expected it to fly. The ship was powered by a Zekely engine and performed well enough to give Pitts an opportunity to teach himself to fly. For hour upon hour, young Pitts flew straight and level, each landing *(Continued on page 47)*

TIME AND DESIGN are considerably different between the first plane Pitts built (below) when he was a 15-year-old farm boy, and the Goodyear racer (above) that Mr. Pitts was working on when this photo was taken



TEST PILOT for Curtiss Pitts (left) is Phil Quigley (right). Planes are the Special and the Racer (right)



USCG SPENCER, a 2300-ton, turbine-powered cutter, was built for patrolling the seas. Recently, however, she was assigned to ICAO as a weather ship. Nine countries have united to share expenses of the U. N. Weather ships

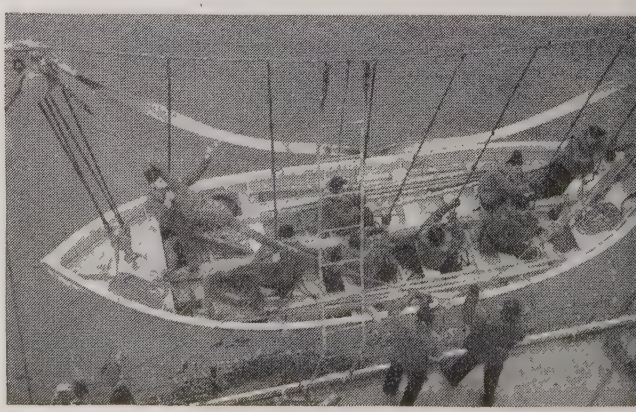
Weather Ships

THOUGH flying the Atlantic is commonplace today, the pilots of the transoceanic airliners do not look upon the 2,000-mile over-water hop as a pleasure jaunt. It's a trip that offers no emergency landing fields, no repair stations, nor any landmarks. Usually, just the sight of a ship is comforting. But if it's a U.N. weather ship, it's more than merely comforting. The U.N. weather ships serve as signposts and information centers for trans-Atlantic aircraft.

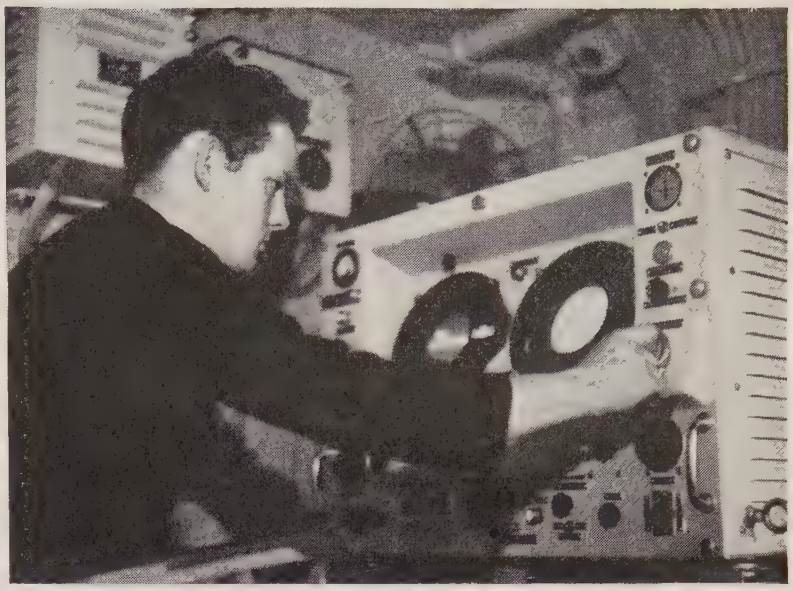
These ships, manning more than 10 stations far at sea, operate at certain essential points in the North Atlantic, along the main air routes. Provided under an international agreement arranged by ICAO, the expenses incurred in the maintenance and operation of these ships are shared by Belgium, Canada, Ireland, France, Netherlands, Norway, Sweden, U.K. and U.S.

Day and night ships such as the *Spencer* are on the air with data concerning position, etc., so that planes passing overhead can get bearings. Often, the *Spencer* talks directly to more than 500 aircraft during its 21-day tour of duty. Detailed weather info is available to any plane. Modern radar scans the skies gathering that weather info as well as watching planes. Indeed, these ships are welcome sights.

RADAR SCREEN towers above the deck of the USCG Spencer. Crew (below) takes life-boat drill as part of program



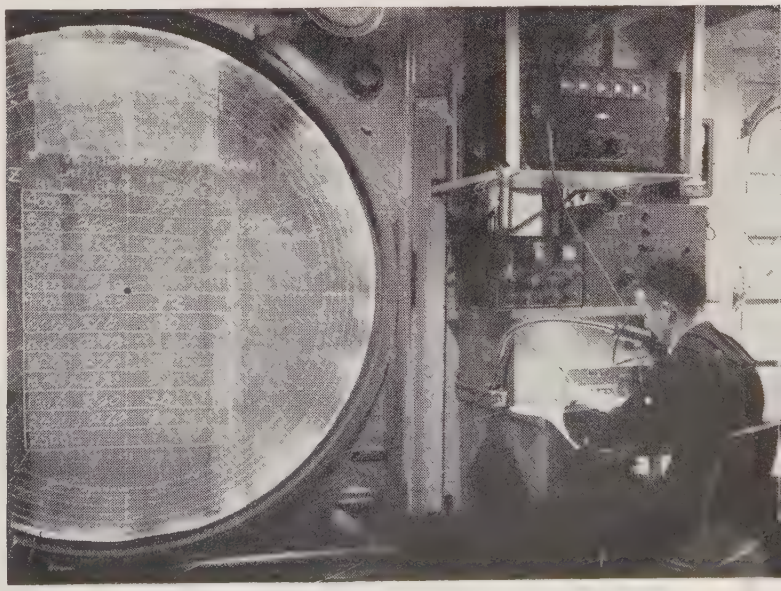
CREWMAN on board the Spencer inflates weather balloon equipped with radiosonde (white box at right). Observer (below) checks the balloon's speed and direction of drift. Radio will relay pressures, temperatures, etc.



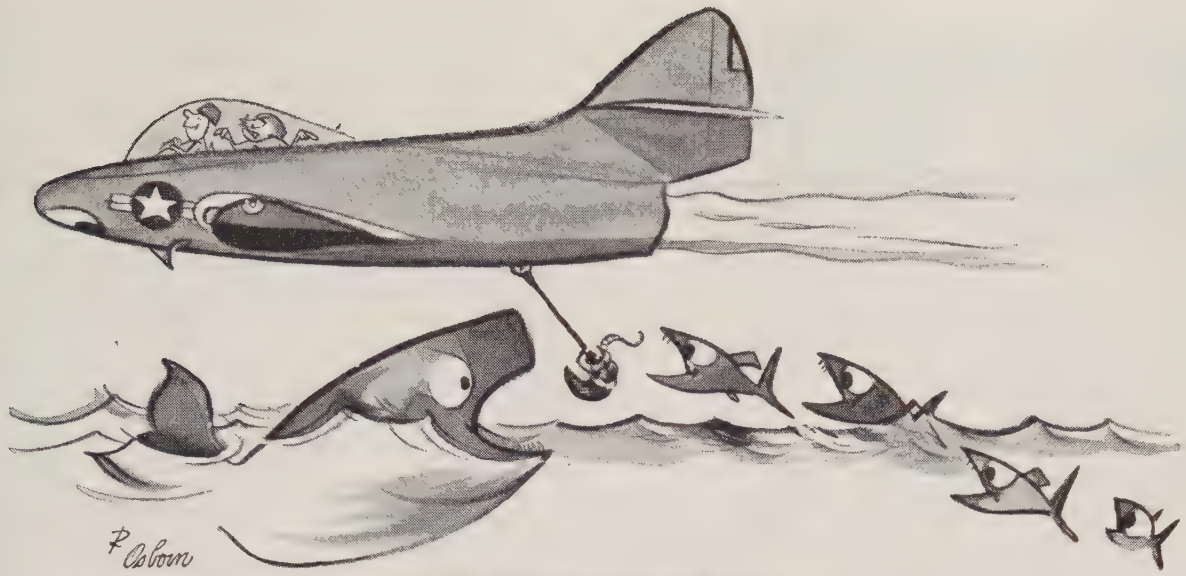
RADAR OPERATOR on the Spencer traces the course of an approaching plane on radar's twin screens. Below deck (below) course of plane is charted on plotting board. In case of distress, plane's location is established

OBSERVER (below) checks data coming in from weather balloon. This info will be relayed to shore stations

RADIOMAN on board ship talks with pilot of a passing plane and gives him latest data from circular chart



Dilbert's LOST week end



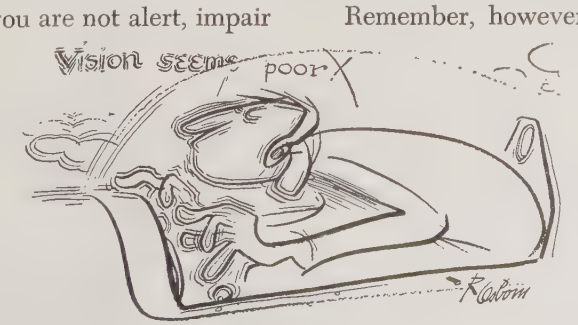
DILBERT

By Seth H. Warner and Robert C. Osborn

Anoxia — The higher you fly the less oxygen there is in the air. Lack of oxygen (anoxia) causes physical and mental deterioration. As you go higher, oxygen deficiency will cause unconsciousness; still higher, death.

Tests have proved that it is dangerous to fly above 10,000 feet very long, without oxygen equipment. Some pilots can't "take it" that high. Any time you go above that, you are courting danger; get down again as soon as possible.

No one is immune to the effects of anoxia. Don't think, just because you are a big hunk of man, that you can take it. All that meat probably requires even more oxygen. The effects of anoxia are insidious and will, if you are not alert, impair your judgment to such a degree that you will be unable to take corrective action. You will be flying high, and probably wide, but not so handsome.



Reaction to anoxia varies with different people and, like intoxication, is not consistent even in the same person. Your reactions may be either sub-normal or impetuous; you may be drowsy one time, exhilerated the next; be over confident, or full of anxiety.

There are certain symptoms, however, which are nearly always present. Impairment of vision is a most reliable sign of anoxia. A second easy check is to note the color of the fingernails. An abnormal white or bluish appearance, instead of the normal pinkish tinge, indicates insufficient oxygen. Difficulty in writing or working out simple problems also indicates this lack.

Remember, however, these symptoms appear only after the brain becomes affected. Like the drunk, this makes it kind of tough to diagnose your own case. All the more reason why it is vitally important that

(Continued on page 53)

CAOA REPORT . . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminatory legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary, to bring about improvements in aircraft, equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 444 Madison Avenue, New York 22, N. Y.

Aviation Clinic . . .

The Corporation Aircraft Owners Association has accepted the National Aeronautic Association's invitation to participate in the Aviation Clinic to be held in Detroit in October. Chairman of CAOA, William B. Belden of Republic Steel Corporation has been named to the Clinic's Executive Committee, and Palmer J. Lathrop of Bristol-Myers, Secretary and Treasurer of CAOA, has been asked to serve on the Clinic's Credentials Committee. Both have accepted these assignments and will represent CAOA at the Clinic in Detroit.

State Air Laws . . .

A new tabulation of state air laws, issued by the Civil Aeronautics Administration, indicates further progress toward uniformity in laws relating to aviation in all States. D. W. Rentzel, Administrator of Civil Aeronautics, reports that at this time only two states have no departments or commissions to which its aviation matters are assigned. Ten of the remaining 46 states have special Aviation Departments, 21 have Commissions, and 12 assign their aviation matters to existing state depts.

Forty-five states require aircraft operating within the state to have federal registration, and 46 require their airmen to be federally certified. A smaller portion of states write their own legislation governing flight, while 18 have adopted the uniform State Aeronautics Act on this subject. Many of the states are training police officers in the apprehension of violators of flying laws, and 12 have special aviation police. In investigating accidents, 24 states have their own special agents, while 26 cooperate with federal investigators.

In the matter of aviation fuel taxes, all but four states levy taxes on motor fuel, but some refund this tax in whole and some in part when the fuel is used in airplanes. Only four states levy taxes specifically on aviation fuel. In 16 states this money is kept and devoted to aeronautical purposes. Full refunds are made in 22 states, partial refunds are made by 12 states, and 10 states grant full exemption.

Plane Protection . . .

A great deal of interest has been shown in a product recently announced which provides a protective coating for aircraft against the effects of weather, minor abrasions, and acids and salt air. Called ReGlo. this new liquid finish is quickly and easily sprayed over metal and fabric to form a hard but flexible transparent film that will not chip, peel, bubble or crack and is resistant to scratching and denting. One gallon of the liquid will cover a lightplane, and the job takes about an hour to do. It dries in from six to eight hours and adds a mere three pounds to the weight of the plane. Not only does ReGlo protect the surface of the plane but it imparts a high-gloss finish. The solution is being marketed by the Regal Air Corporation, of New York.

News Notes . . .

The Minneapolis-Honeywell Regulator Company is offering the public its first look at its recently developed electronic fuel-gauge system. This new system is similar to the present Honeywell fuel gauge but offers a weight saving of about 30%, provides a low-level fuel warning and uses considerably smaller fuel indicators. First showing of this new fuel-gauge system will be at the SAE meeting in Los Angeles, October 7, 8 and 9th. . . . Representative Lyndon Johnson of Texas is campaigning for a seat in the U. S. Senate by helicopter. Johnson journeys all over the State of Texas in his "flying eggbeater" and not only drops down in out-of-the-way places to talk to voters but sometimes hovers directly overhead to give his campaign talk to awe-stricken groups below. . . . Robert E. Hage, design engineer for Boeing, predicts turbo-jet transports will be available for airline or executive use within three years. These ships will have a speed of 500 mph and will fly at an altitude of 7 miles, reported Engineer Hage at the annual summer meeting of the Institute of Aeronautical Sciences. . . . The Chicago Tribune now boosts a converted B-17 for the exclusive use of its owner and publisher, Col. Robert A. McCormick. The main cabin has seven reclining airliner seats, two of them swivel type, an executive desk, a secretary's desk, a snack bar and a dressing room. A group of flight instruments are mounted on a forward wall in the cabin for the interest of executive passengers. The bombardier's nose has been converted into a unique observation lounge. Pilot of this executive B-17 transport is former American Airlines pilot, Captain Howard West.

NEWEST ADDITION to the Chicago Tribune staff is this converted B-17. The bomber has been completely restyled for its owner, Col. Robert McCormick

BOMBARDIER'S NOSE of the B-17 is now a glassed-in lounge. Capt. Howard West (right) is ship's pilot

Problem of Air Safety

(Continued from page 31)

Engineering), so-called improved wicks for commercial use are being advanced by aircraft accessories companies as answers to the problem. In promoting wick development, some of these agencies still retain the cotton-wick concept, but substitute in place of the sliver salts even more unstable and ineffective conductive impregnants. Others are replacing the cotton wicks within the plastic sleeve with a plurality of fine metallic wires. These wire dissipators have been developed without appropriate ionization and radio noise tests.

It is evident that the latter changes spring from the development by the author of an electrostatic dissipator for aircraft which is based on the underlying design principles of highly sensitive ionizers—ionizers with which he has experimented for years and which have been applied successfully in eliminating static electricity in fire—and explosion hazardous industrial operations.

This aircraft ionizer consists of an alignment of several tufts two to four mil of stainless steel bristles. The bristles are anchored through holes across the width of a narrow rectangular metal base-plate. In mounting, the base-plate is bent over the trailing edge of the airfoil so that the bristles point outward, extending into the slipstream. The points of the bristles, which project about one and one-half inches, are etched chemically to vanishing fineness. Various bristle sizes are used depending on the place of installation on the aircraft.

One foreign-developed radio navigation system was threatened with failure because electrostatic interference caused the needles of basic instruments to rotate rather than hold true positions. In attempting to correct the aberration, every known means of discharging the electrification of aircraft, including the AN wicks, was tried with no success until the metallic bristle ionizers were installed.

Proper discharge of static electricity becomes increasingly important as aircraft become more complex, and the wider use of safe-flight radio systems depend on the elimination of interference.

The success of GCA—Ground Control Approach—is threatened by communications blackouts caused by static interference. Since an essential part of this system is the talking of a plane down to a landing by directions from ground radar operators, it can be successful *only* when the pilot can receive dependable directions. Under the adverse weather conditions when GCA landing aid is most needed, electrostatic radio interference is also likely to be at its worst. This may block the pilot's reception of intelligible directions—a formidable barrier that has been amply proven by cases of airline pilots unable to get radio contact for long periods of time in bad weather.

Other dangers to aircraft safety revealed during electrostatic experimentation over the past few years involve propeller systems, engines and possible damage to main airfoils with inadequate protection.

An important source of radio interference is that caused by electrostatic generation, discharge, and high-frequency oscillations on propeller blades. Propellers on commercial transports have blades which average about six feet in length. The tips operate in different speed classifications between 400 and 700 mph. Since, at these speeds approaching sonic value, the generation of static electricity is believed to be in the order of the fourth to fifth power of the speed, the density of the electrical charge developed becomes several times greater than that on any other part of the airplane.

Because of the sharp tips and trailing edges of the blades, discharges of burst-pulse corona—as sparks—more readily occur here than elsewhere on the plane. In addition to promoting interference in nearby radio antennae, these corona-impulse discharges establish oscillations in the propeller blades wherein the blades act as complex quarter-wave antennae.

ERCOUPE twins . . . and you're not seeing double. Millard Davis, as a stunt, bolted two Ercoupes together on theory two would be twice as good. It flies.

The discharge of static electricity from the propeller also occurs through the oil films in the bearings of the engine in attempting to equalize its potential with that of the airfoils. The effects of these electric discharges display themselves as spark craters, commonly on the front thrust bearing, to a lesser degree on the main engine bearings and occasionally on the rear bearings. Airline shop inspectors concur in stating that these spark blemishes are worse and more frequent in winter than in summer and that during flights through snow more intense blemished conditions may develop on a single long trip—causing a "rough engine" and requiring immediate overhaul. Normally the electric discharges from the propeller blades pass through the oil films of the bearings, mostly as alternating current and in part as direct current. Oscilloscopic study of engines operating in tests after overhaul have revealed that instantaneous values of resistance occur in oil films which attain almost infinite magnitudes, causing electrostatic sparks which pit the bearings.

The proof of sparking within the engine crankcase at the bearings reveals not only a condition costly to the aircraft operators, but a hidden disaster potential.

The crankcase of any internal combustion engine is filled with a flammable mixture of fuel vapor and air which escapes into it from the cylinders during compression and explosion cycles. Any such mixtures continually pass through localized variations of leanness and richness—both within and without the range of flammability. The explosive range for gasoline vapor lies between 1.6 per cent and 6.0 per cent by volume with air. Carbon monoxide, which also seeps into the crankcase from the cylinders, has an explosive range of 12.5 per cent to 74.2.

The hazard of sparks near explosive mixtures is obvious. The initiation of an explosion in the crank-case requires the simultaneous occurrance of two essential elements: 1) a spark containing sufficient heat energy to ignite the explosive mixture when it occurs in an exposed location, and, 2) a fuel vapor and air mixture within the explosive range when it is exposed to the spark. The coincidence of these two factors may explain some mysterious engine explosions and fires in which engines have blown away from wings or have dropped off after fire weakened the supporting structure. The odds against the simultaneous presence of the two essential factors somewhat mitigate the potentially hazardous situation.

The electrostatic discharge of propeller blades and the by-passing of residual discharge current around the engine crankcase can be accomplished simply and inexpensively as proven by tests.

Propeller blades can be provided with tufts of sharp-pointed bristles of stainless steel wires mounted on the trailing edges about six inches to 12 inches from the tips. The installations satisfactorily withstand the destructive air forces of high-speed turbulence which would destroy any type other than a metallic bristle discharger. Radio noise tests to determine the possibility of electro-blemishes which cause single needle point dischargers to produce interference show that this has not occurred with tufted dischargers. Life tests of four-tufted ionizers, which subjected them to about 1500 hours of continous discharge at excessive currents, followed by microscopic examination of the bristles, showed no deterioration of the points and in fact, showed no difference in appearance from newly made ionizers not yet tested.

The by-passing of residual electrostatic currents from the propeller to the airplane structure without going through the crankshaft, bearings and gearing of an engine requires a wiper-brush system at the propeller hub. While the grounding brush used in electrically controlled propeller systems conducts the DC component of propeller current, it does not discharge the VHF AC component generated by the blades since this requires outer surface contractors. These are provided for in an electrostatic discharge system which includes blade tufts and wiper brushes.

In the promotion of safe electrostatic discharge and the prevention of engine crankcase sparking with this system, it is assumed that the airfoils are also equipped

(Continued on page 40)

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Problem of Air Safet

(Continued from page 39)

with effective ionizers. If not, equally d structive discharges would take place the reverse direction from the engines the prop through the engine crankshaft.

Another injurious aspect of the stran behavior of static electriciy shows up high-speed commercial transports in pe forating the airfoils near the wing a stabilizer tips, causing melted holes in t aluminum skin ranging from the size a dime to that of a bill. Some of the holes, accidently discovered by the auth while checking an airplane for the i stallation of bristle ionizers, were in are close to the attachments of the AN wic used on that plane. This discovery led tests of the wicks which demonstrated th were defective as dischargers.

Several other commercial transports this same high-speed type were then i spected the same day—with perforatio found on each of them.

Lightning was the cause first advanc to explain the holes. However, during t period immediately preceding the disco ery, these airplanes had been making th scheduled runs over the same route, which time the weather generally w fair and without lightning storms. Als no such damage was found on two oth types of aircraft, one rated at about h the speed and the other at two-thirds t speed of the first type, which travel the same routes at about the same al tudes as the high-speed planes.

The electric charge which might generated on the high-speed transport comparison with that on the low-sp plane during the same atmospheric cha ing conditions ranges between eight a 16 times more. Destructive high-potent sparks may readily discharge from areas at wing and stabilizer tips wh rivet burrs, for example, might initia the discharge.

Whatever the indirect causes of the p forations in the airfoils, the fact remai that these extraordinary hazards to hig speed commercial aviation exist. The a cumulation of the electrostatic proble mentioned, involving propellers, engi and aircraft and communications systen require immediate steps toward their ac quate solutions.

Unfortunately, neither the manufact ers nor the airlines, as interested parti are financially able at the present time undertake the burden of the elabor program of research necessary to inves gate these highly specialized electrosta problems. Again, neither one person n any one organization is at present endow with the knowledge and experience provide the solutions to all the proble in the field of electrostatics.

A coordinated program, involving interested parties to the problem—milit and civilian, airlines and aircraft man facturers and experienced engineers—p moting continuing intelligent research, required to cope with mounting barriers electrostatic phenomena to the safety a control of flying.

Jets for the Air Navy

(Continued from page 16)

on planes parked close behind; pilots in planes behind a jet tuning up might be asphyxiated in the closed cockpit by the fumes. All in all, it looked like a long hard road before jet aircraft could qualify for carrier operations. It might be 1950, 1952, 1955.

This attitude on the part of the experts was no attempt to fool the public or to discredit the new propulsion system. It was merely an attempt to anticipate and correct possible difficulties. The idea might have been oversold, for it is easy to accept as fact almost any plausible argument about a little known subject. And, it made good reading. Success is not spectacular, trouble sells copy.

A flurry of interest and conjecture was created when the British landed a *Vampire* aboard *HMS Ocean* in December 1945. But almost a year passed before the Navy landed its first experimental *Phantom* aboard the *USS Roosevelt*—and apparently no particular progress had been made in the intervening time. One of the Navy's largest carriers could handle one well-groomed jet and pilot. The jet was light, it carried no armament, the pilot was a specialist.

A few months later a modified F-80 worked out aboard ship. The long take-off run of the F-80 was well known. "With a military load," so said the boys, "it would be practicing real salt-water operation—off the end of the deck."

Then in April of this year two North American *Furies* went aboard the *USS Boxer*. The two jets operated satisfactorily. But it definitely was not a test conclusive. Two jets hardly constitute a squadron. A few landings and take-offs didn't constitute carrier operations. Said the boys with the fat cigars and the honest look, "Jet carrier perations will require some more doing.'

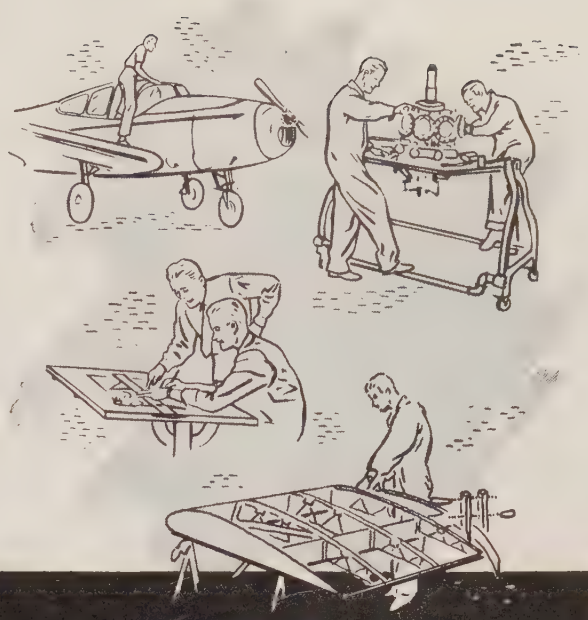
So, a month later VF-17A, the first Navy jet squadron to form, which had been quietly whipping their organization into shape for the past year at Quonset Point stated: "We're ready for carrier operations."

It was as simple as that. The *USS Saipan* steamed out of the bay, headed into the wind and brought aboard 16 McDonnell jet fighters. In the cold blustery waters off the New England coast, the squadron went about doing all the things off a carrier any outfit does during carrier training. Commander "Moose" Fuoss, famed skipper of the outfit, had trained his men well, they had complete confidence in their planes. And they ably furnished the answer to the big question of whether it could be done. On the third day of operations representatives of the press came aboard and watched the FH's perform. In a way it was somewhat disappointing —it looked too easy.

Tafe-offs with a full load of gas and ammunition, unassisted by catapult or JATO, offered not a single thrill. Even the short 660-foot deck of the *Saipan* offered no apparent hazard. The run took most of the deck, but pilots were obviously not attempting to pull their planes off. They never sank after clearing the end of the deck, but consistently pulled into a nice snappy climb. Wheels and flaps went up fast. Catapult shots gave the same answer, the planes left the deck with nose high and in a steady climb. The pilots said that 'though the jets didn't get off as fast as the conventional jobs, their new steed never felt sloppy as did some of the old prop take-offs.

Some people predicted trouble with the higher landing speed of the jet and residual thrust effect. The *Phantoms* appeared to come in only slightly faster than conventional fighters. There appeared to be little or no floating tendency. More Number One wires were caught by the jet hook than is usual on carrier landings, and the tricycle configuration allowed the pilots to come in fast and stick on by letting the nose drop a bit more than can be done in prop jobs. Approaches were never sloppy and, when a wave-off was given, the planes answered fast to the throttle and got away with plenty of altitude. The full forward and down visibility afforded by the jet's cockpit position makes for fewer bad approaches and allows the pilot to fly his plane all the way to the deck. With a radial engine in front and its big prop, the last few feet of any landing is fairly blind; not so on the jets.

(Continued on page 45)



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TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD

Navigating Solo

(Continued from page 17)

sweeping view. He cannot see distant landmarks which aid the pilots of higher flying airplanes. In addition to these difficulties, the pilot is in a small cockpit where he lacks space for spreading out maps and for computations required for the more complicated systems of navigation. There is no doubt about it; the lightplane pilot must be a pretty sharp navigator and his job is harder than that of his faster flying colleagues.

A few simple precautions may make the job of lightplane navigation seem less like a sleight-of-hand performance:

1. *Knee Clipboard.* A clipboard that fastens to your knee will help immeasurably in keeping your map and "log" off the floor. Any ordinary clipboard may be utilized by attaching a homemade metal knee clamp or straps to the under side of the board. Use the clip to clamp your map on the board and then, with a paper clip, attach the paper for your flight log to the corner of the map. Carry a few spare paper clips in case you lose one. With map and log anchored to your knee, you'll have fewer paper worries, and the clipboard provides a firm writing surface.

2. *String.* This is one of the most essential pieces of equipment for convenient navigation. Tie your pencil on a string to your clipboard. The best place for your computer is on a large loop of string around your neck. A Weems plotter or a rule which combines sectional chart mileage measurement with a protractor will save you from having to carry both ruler and protractor, thereby cutting down on the number of articles to be accounted for. The Weems plotter or rule may also be tied to a string around the neck. At any rate, tie it to something. With all your equipment securely moored, you can drop something when you're through with it, and still be able to pick it up again—quickly. No more of that undignified hide-and-seek game on the floor and in odd corners of the cockpit, a game which too often ends with the plane several miles off course and headed 30 degrees in the wrong direction. Speaking of string—be sure to make it long enough so that you won't choke yourself, and short enough so that it won't be mistaken for a trailing antenna if your pencil blows out the window.

3. *Take care in folding maps.* Don't be afraid of spoiling a new map by refolding. It's better than knocking the sides out of the cockpit with full-spread map-folding gymnastics en route. Fold the map so that it can be unfolded, accordion fashion, along your route. For short trips the map can be folded so as to show the entire route. Buy an up-to-date map but don't throw away your old ones. Toss in an extra map—maps have been known to blow out the window!

4. *Computer.* Don't be scared off by the big complicated computers. If you don't care to buy an expensive one, get any small, inexpensive computer that has an accurate time-speed-distance scale. Learn to use this scale and use it *well.*

5. *Learn to fly a good compass heading.* The turbulance often encountered in lightplane flying may set the magnetic compass swimming, but it will help if you know what to expect. Remember that when turning to the north from east or west, or from any intermediate heading, there will be a compass *lag,* so stop before you get to the heading and give the compass card time to catch up. The amount of lag at north is roughly equal to your latitude. Thus, if you are at a 30-degree latitude, roll out of the turn when the compass card says 30 degrees when turning from an easterly heading, or at 330 degrees when turning from a westerly heading to north. When turning to points between 270 degrees and 360 degrees or between 90 degrees and 0 degrees, there will be a proportionate amount of lag less than 30 degrees. There is no lag at 90 or 270 degrees.

When you're heading south the situation is reversed and there will be a compass *lead,* so let the compass card swing 30 degrees *beyond* south before rolling out. It will settle back to south when you straighten out.

Another compass characteristic is important to the pilot trying to hold a heading. When flying in a northerly direction (in the northern hemisphere) and making a turn of moderate bank, you will find that the compass will first indicate a turn in the opposite direction before swinging back to indicate the proper direction of turn. When flying in a southerly direction, the compass will indicate the correct direction of turn, but will show a rate of turn much faster than it actually is. Thus it is easier to hold a southerly course than a northerly one. In fact, a very shallow turn may not show up at all on the compass card while you are making the turn and flying near a northerly heading.

If all these compass antics seem confusing, remember that the best way to turn to a desired heading is to visualize yourself in the relation to a horizontal compass rose rather than watching the compass card. The compass never reads correctly during a turn, and you must fly on a straight-and-level heading for a time before you can get an accurate reading.

6. *Keep a log.* Unless you're a master mind, you can't keep everything in your head. Mark down time over significant check points. You can figure out ground speeds and ETA's at your leisure, but remember to *get the time down on paper* when passing over significant check points. *Fly the clock,* and though you may get off course, you'll never be very far lost. When a check point doesn't show up on time, start looking for your error.

7. *Lining-up.* If possible, get a good starting heading by lining up two objects. This is especially important if you are in doubt about the accuracy of your compass. No matter how badly your compass is off if it swings at all you may get a good heading by noting on the map two points directly in line on your course. For instance, you may note that a course-line drawn from the center of your airport to your destination passes directly over a railroad intersection near the airport. It will be worth the extra time to climb to cruising altitude, get directly over the airport, and head the airplane so that, taking drift into consideration, it will follow a straight line to the railroad intersection. The pilot must use his judgment in estimating the heading at first and will probably need to make minor adjustments of heading to get that which will take him in the right direction. This "lining-up" method is strongly recommended where you suspect that the winds-aloft report is incorrect.

Once you have established an approximate heading by the lining-up method, use the second check point as a point of departure from which to compute your ground speed. If you're lucky that heading may take you nicely along your course. It you appear to be drifting off course, *hold the heading* long enough to get data for an off-course computation.

Of course, it's nice to have a radio, a directional gyro and a radio compass. *Of course,* you should have a good compass that has been swung recently. *Of course,* it's better to have two persons, one to fly and one to navigate exclusively. But if you don't have these—if you're flying solo in a 65-hp plane—you can still do it efficiently.

You don't have to be either an octopus or a mental giant to navigate solo. Tie everything down, learn the techniques best suited to your speed and horsepower class, and you'll find yourself navigating with poise . . . and proud of it.

FLIGHT SCHOOL operator in Maine hinged top of Champion's door to facilitate pilot's getting out of cockpit to spin the propeller

PLANE FAX

A page of service tips for private flyers and fixed-base operators

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Carburetor icing may be indicated when loss in rpm, sticking throttle or erratic engine operation are noted when outside air temperature is 70° or less, even though rain, fog or other visible precipitation may not be evident. At the first indication of erratic engine operation, apply full carburetor heat.

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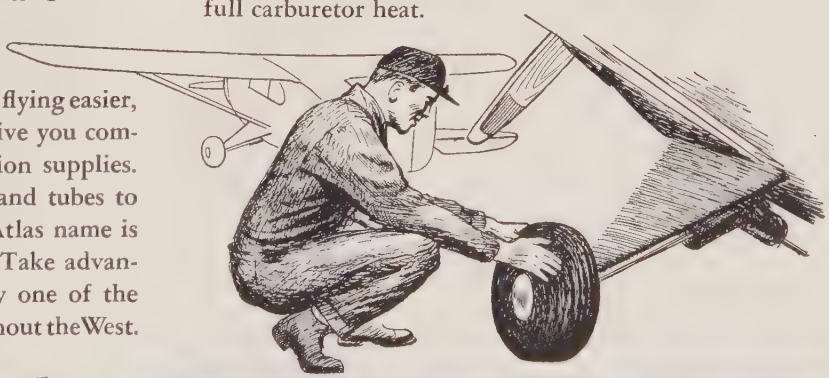

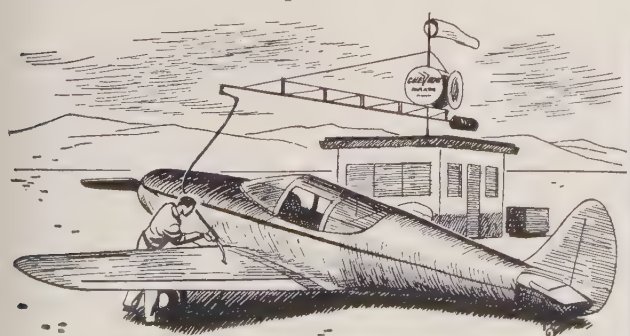

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Pilot's Report

(Continued from page 20)

in sunny Southern California, according to Chamber of Commerce reports, this article is necessarily based on two different flights. On the first attempt, the dew was too close to the ground to investigate any of the high-altitude characteristics of the plane.

"No one who has a license needs a check-out flight in that airplane," replied Harvey Martin as we asked him to go around the field with us at Long Beach.

"It flies just like the old *Cruiser* except that it gets off the ground a little faster," continued the Distributor.

Reluctantly, he went along on a quick trip around the field. After all, it was his airplane and his insurance policy, and it is much easier for a reporter to discover short-cuts about any new airplane from a pilot experienced in that particular model, rather than to stumble into them.

"As soon as the tail starts up, ease back on the stick and pop one-quarter flaps," advised Mr. Martin as the Long Beach control tower cleared us for take-off.

With two of us in the plane, the take-off roll was similar to that of the little yellow *Cub* trainer flown solo. We climbed rapidly over the oil wells of Signal Hill.

Once clear of the traffic pattern, we tried some tight turns and partial stalls under the low layer of clouds. It was just like the old *Cruiser* all the way along. Only on landings was there a noticeable difference where the broad flaps are a great help in glide control. The new version is not at all "slippery" and need not be slipped violently to slow it down, but there is considerable buffeting over the elevators when full flaps are used.

Mr. Martin's only comment on this short flight was that most pilots, this reporter included, have a tendency to skid the nose over in front of them as they break their landing glide, since they are accustomed to sitting in the middle of a *Cub*.

We puddle-jumped around under the clouds and shot landings at the close-in airports at Lomita, East Los Angeles, Vail, Monrovia and El Monte. Flying the airplane solo, it is easy to come across the fence with full flaps, partial power and indicating 55 mph, and turn off the runway within 500 feet without skidding.

The normal comment from spectators was, "That's the first time I've ever seen a *Cub* with flaps." Only when they were close enough to see inside the cockpit did they realize that this was the new model.

On our second flight, made in ideal Hollywood weather, we asked Mr. Martin for an OK to take the new *Cruiser*, fully loaded, into the highest commercial airport in Southern California—at Big Bear Lake. This gravel airport is 6,850 feet above sea level.

"Why not wait until I get a controllable prop on the ship?" Mr. Martin asked. "It'll get out of Big Bear, I'm sure, but it might not look too well with a full load."

We admitted that it was almost "dirty pool" to test-hop a lightplane at that altitude but, after all, if the new *Cruiser* would take a full load out of a 6,850-foot high airport, wouldn't it perform well almost anywhere in the country? Why not try it and see?

So we did.

One tank was filled, the other half filled, and we took off for the Monrovia Airport to pick up additional passengers. When we added up our combined weights, we had 640 pounds in pilot and passengers and 25 pounds of camera equipment. Discounting 10 pounds of fuel burned between Long Beach and Monrovia, we took off with full gross weight.

While factory specifications say that the rate-of-climb is 575-feet-per-minute, it took us an even 30 minutes to climb from the 500-foot-high Monrovia Airport to an indicated 7,500 feet. It may have been that 85 to 90 mph was too fast an airspeed for the best rate of climb. Perhaps the engine needed a tune-up job. But at full throttle, with the mixture leaned out at higher altitudes, our rate of climb averaged less than 300 feet per minute. The tachometer indicated 2,425 rpm at 90 mph.

With four tall people, the *Family Cruiser* is a little cramped. The back seat is barely big enough for two broad-shouldered passengers if each sits with his outside shoulder in the rear window recess. The front seats are not adjustable. On a long flight, all passengers might become a little cramped, but our 42-minute climb to Big Bear caused no discomfort. This trip by auto takes anywhere from 2½ to 5 hours, depending on the amount of traffic.

The new *Cruiser* is just as stable as anything Bill Piper ever put into the air. The mid-afternoon air was comparatively calm and most of the climb was made with the ship trimmed "hands off." With full throttle, there is considerable torque, and a heavy right foot was needed to maintain a straight course.

The airport at Big Bear has been a graveyard for many low-powered or poorly flown aircraft. The field itself is in a narrow meadow between Big Bear Lake and Baldwin Lake. Heavily wooded mountains rise on both sides so that take-offs and landings are made over the lakes.

A moderate west wind was siphoning white dust from the dry surface of Baldwin "lake" and kicking up ripples in the blue water of Big Bear. We circled the field once and came in on a long final approach over the golf course at Big Bear. As is usual in a strange airplane, we came in a little fast and had to drop full flaps to touch down in the first 300 feet.

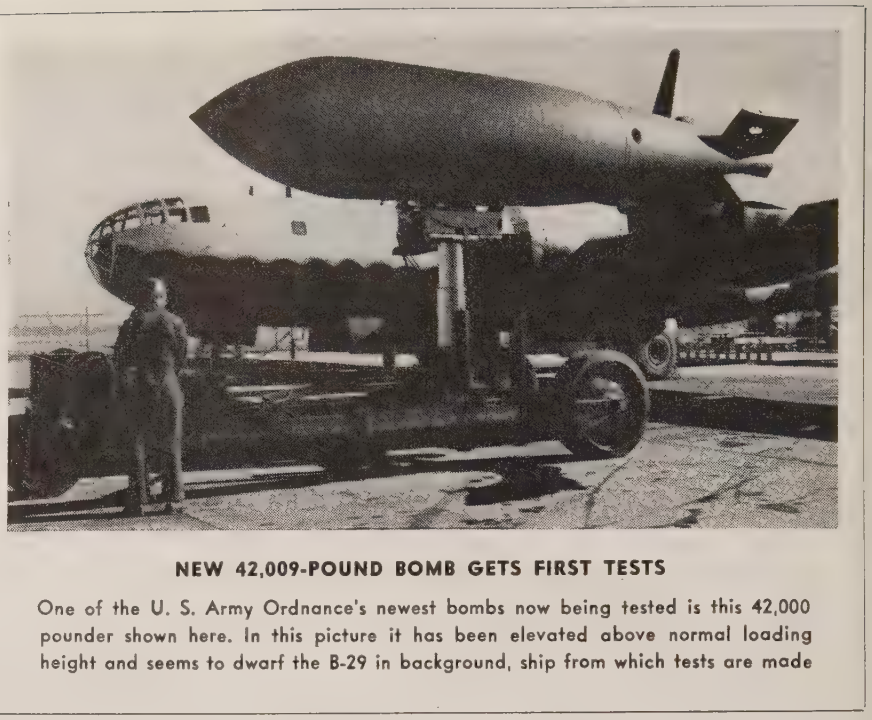
Taxiing up to the hangar, the right brake pedal went clear to the floor without effect. A mechanic checked the lines, tightened a slightly loose fitting near the right wheel, and refilled the reservoir.

There have been many hair-raising stories about take-offs from high-altitude airports, and rather than write another on this *Cub* flight, we decided to try a couple of take-offs solo and see how the new *Cruiser* performed before taking off with a full load. Prior to this trip, the highest field that this *Cruiser* had flown out of was at Reno, Nevada, with an altitude of just over 5,000 feet.

Into a wind of about 12 mph, the first solo take-off was made in 11 seconds. When we added one passenger, the take-off roll seemed to be about 100 feet longer. Best engine performance at this altitude was obtained with the mixture materially leaned out.

It was not, however, without a little doubt, that we taxied up the gravel strip for take-off with four people again aboard. In fact, we taxied another hundred feet out into the meadow, to assure the longest possible take-off roll. Once the throttle was opened, the heavily-loaded plane accelerated slowly. With the stick well forward, the tail-wheel was still on the ground when we passed the spot where the plane had been in the air solo. As soon as the tail-wheel left the ground, acceleration was noticeably faster. As the airspeed crawled past 45 mph, we dropped a quar-

(Continued on page 46)



NEW 42,009-POUND BOMB GETS FIRST TESTS

One of the U. S. Army Ordnance's newest bombs now being tested is this 42,000 pounder shown here. In this picture it has been elevated above normal loading height and seems to dwarf the B-29 in background, ship from which tests are made

Jets for the Air Navy

(Continued from page 41)

Pilots pointed out that jets do away with the old torque fear, and that full throttle can be applied with no thought of torque-induced spins.

The effect of the jet exhaust on deck handlers had been obviously overrated. For the most part the boys seemed to forget it except when the jet was turning up full and one of them happened to be right in the line of fire. It was a cold day and some of the deck men took advantage of the jet exhaust to warm numbed hands. No one was bowled over by the blast or even singed by the heat. Planes lined up directly behind aircraft taking off. Pilots with their canopies open sometimes slipped on oxygen masks to keep out the fumes at close range. Deck personnel merely turned their backs.

Auxiliary starters are required with the jets, but this was handled expeditiously and with no slow down, by a couple of battery-equipped jeeps. Two jeeps easily handled the 16 planes and since no warm-up was necessary, the jets would move right into take-off position or onto the catapults after a start. The normal take-off interval was sufficient to allow plenty of time for starting planes. The lack of warm-up would get the planes into the air minutes after a general quarters alarm. Ready planes instead of standing by warming up in the future will merely keep a starter handy.

A goodly percentage of the jets automatically cleared their hooks of the arresting wire after landing with a short wind roll-back; the rest were cleared in rapid fashion by crew members working with a sort of boat hook. At any rate the jets cleared the hook as fast as any carrier plane. They taxied around the deck with facility, even faster than propeller planes, and the straight-ahead visibility almost cancelled the need for deck guides. The perfect forward view also allowed the pilots to park their planes on a dime and spot them on the catapult with little or no assistance from deck men.

The barrier problem has been licked satisfactorily. During the three days of operation aboard the *Saipan,* only one VF-17A plane went into the barrier. This one sustained no damage. An arm in front of the cockpit raises to pick up the barrier wire as a lower wire catches the main gear. The arm in front of the pilot is so constructed as to cut the wire before allowing it to saw through the pilot's windshield.

Gassing the planes takes slightly longer than fueling conventional planes due to the additional capacity. However, the lack of warm-up time alone will more than take care of that time element. In addition, the jet will have more time to loaf around the deck anyway. At 600 mph it doesn't take the fighter long to get its job done. A fighter strike that used to take an hour of flying each way in the old days at 300 mph will be cut in half in future operations.

There are no more engine checks or plug changes. No exhaust stacks to replace and time lost listening to a missing cylinder. The life of the jet engine is considerably shorter, it is true, but an engine change takes about the same time as a plug change used to in the piston engines.

So now, jets have qualified at sea and it looks very simple. What held up the show back in '45? The boys in VF-17A have a quick answer for that. Navy jet aircraft didn't go to sea in 1945 when the first British jet landed aboard because there were no jets available. In 1946 when the first *Phantom* worked out on the carrier *FDR* it was the only *Phantom* the Navy had. It took time to design, time to get into production and then time to train pilots. In other words jets weren't qualified for carrier operation earlier for the same reason one doesn't eat apples the day after the seed is planted . . .

There may be one more question: Does the *Phantom* squadron trials qualify all jets for carrier operation? No, certainly not. Future jet types will have to fight their own battles. However, the other day the Navy bought a goodly supply of Grumman F9F-2 and McDonnell F2H-1 aircraft. These planes were designed some years later than the FH-1 and their performance figures imply the boys weren't napping. Odds are that when enough planes and trained pilots are produced to outfit *Panther* and *Banshee* squadrons, they'll move into the lineup like Michigan's second team — out-performing the first team.

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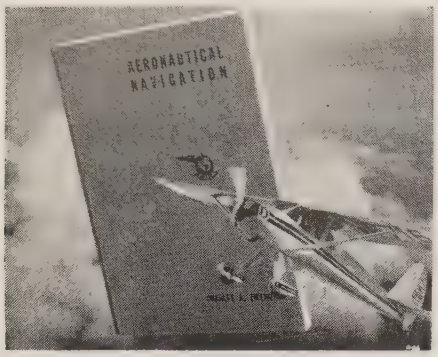

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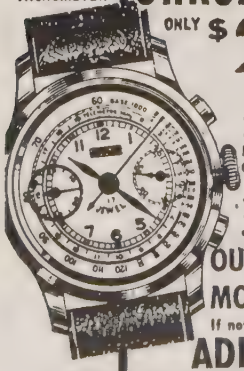

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Pilot's Report

(Continued from page 44)

ter flaps and the *Cub* pulled right into the air. We had consumed about 2,500 feet of airport, and there was plenty left. When we crossed the end of the mile-long strip, we had perhaps 100 feet and a comfortable 85 mph.

After take-off, the flight pattern is directly out over Big Bear Lake. Depending on how fast the airplane climbs, a pilot may either go up over the rim of the mountains surrounding the lake or he may fly down the length of the lake and out over the dam. The latter route takes less altitude, but there isn't a field the size of a shirt-button for a forced landing. The hopped-up little four-cylinder engine didn't miss a beat, but we all felt better when the pine trees were behind us.

The flight back showed an indicated air speed of nearly 110 mph at 7,000 feet; that's 125 mph at 2475 rpm. Not bad!

Cub designers must have spent many an over-time hour figuring how to expand the three-place job into the four-place *Cruiser*. Widening the front seat seven and a half inches was easy enough, but how to get people in and out again presented quite a problem. The slide-rule men solved this one with a Rube Goldberg idea of having the right front seat fold up like an accordian, permitting fairly easy access for the pilot. Then the copilot climbs in, unfolds the seat forward under him, and secures it in place with a spring-loaded catch. If the seat is not securely fastened, the copilot drops back into the laps of the rear-seat passengers (this happened to us) as soon as he relaxes and leans back. It was subsequently explained that the seat can be checked by operating the flap handle located between the seats. If the flaps won't work, the seat is not secured.

Another unusual wrinkle about this folding seat is the location of the safety belt. The inside end is fastened normally between the seats, but the right end of the belt ties to the fuselage just forward of the rear seat. That makes the belt ride very high on the copilot's waist.

Much of the low sale price of this plane is directly traceable to the tooling of the three-place *Cruiser*. From the trailing edge of the wing aft, this plane is identical to the older model. The wing is the same except for the flaps inboard of the ailerons. In the front section of the fuselage there have been several minor changes. The passengers sit four inches farther back, the battery has been moved forward to behind the front seat and the landing gear construction has been changed.

Forward of the fire-wall, the old 100-hp engine has been hopped-up by using a higher lift cam shaft and faster lift valves, a change in piston design and a larger carburetor scoop that adds eight horsepower in itself because of the ram-air effect. This scoop can be added to all old three-place *Cruisers*, and planes with certain engine serial numbers may be hopped up to 115 hp. There is no possible conversion, however, for an older three-place *Cruiser* to the new four-place job since the front section of fuselage is wider.

Among the other innovations on this plane is the unusual fuel system where two lines lead out of the left fuel tank—one at each end. All take-offs and landings should be made on this tank since it will draw fuel at any flight attitude. The change-over valve is located just under the pilot's left knee. The tanks are not, however, fitted with quick-drain fuel sumps, and sediment must be drained from a fuel strainer under the cowling.

Many current model airplanes have bulky, unstreamlined tie-down rings hanging from the wing-strut junctions. The new *Cub* has a neat little webbed-strap wrapped around the metal front wing spar just outboard of the strut. Access to this tie-down is made by removing an inspection plate and pulling the strap out of the hole. Before take-off, the strap is replaced, the inspection plate snapped into place, and nothing remains hanging out in the breeze.

One of the most un-handy features of this plane is the location of the trim tab. It's right where it was on the three-place job. The trim tab worked out fine on the older model since the throttle was mounted on the left side of the fuselage. On the new four-place plane the throttle is mounted in the middle of the instrument panel like almost all side-by-side aircraft. So you take off with the stick in your left hand and your right hand on the throttle. As soon as you get into the air, the plane usually needs trimming out for climb so you must either change hands on the stick (a maneuver that few pilots enjoy close to the ground) or reach across with your right hand and roll the trim tab. This becomes increasingly complicated if the person in the right hand seat happens to be doing the flying.

This airplane is sold with a two-way radio as standard equipment. Since the noise level in the cabin is a little high; even higher if the left window is opened for ventilation, the radio is equipped with a head-set rather than a cabin speaker. Also listed as standard equipment are an automotive-type electric starter and generator, 12-volt battery, muffler, navigation lights and a cabin heater. The heater vent, located between the rudder pedals, does double duty as a cold-air vent when a manually-operated valve is opened.

The arrangement of the knobs and levers in the cockpit, with the exception of the trim tab, shows a good deal of engineering thought. The mixture control, complete with idle cut-off, is placed at the far right side of the panel so that no one could mistake it for the carburetor heat placed in front of the pilot. There is ample room on the control panel for additional instruments.

Keys operate the ignition switch, but there is no lock on the door.

For an airplane that has been built to a price, Bill Piper and his engineers have done an unusual job in adding an extra seat to their already proved *Cruiser*. It may well be the answer to many a flying family's personal and business airplane problem.

This new conversion could easily prove as popular as the original little yellow *Cub* trainer. You've probably guessed your reporter liked it—plenty.

Pint-Size Racer

(Continued from page 33)

ttempts being determined by when the ngine quit or when Pitts found a field e considered suitable for a landing try. efore young Pitts could teach himself irns, however, this ship cracked up, rtunately without injury to its builder.

Discouraged perhaps, but certainly not issuaded from his aviation interest, Pitts emporarily gave up building an airplane. nstead, he put his airplane ideas down on aper, and took a correspondence course n engineering to better carry out at some ter date the design theories he'd deve-ped. Along with this course in engineer-ig, Curtiss Pitts took up flying, and sub-equently won an instructor's rating.

In the few years that followed, Pitts did me pilot instructing, became part owner nd operator of Hart Field in Jacksonville, lorida, then gave up his ownership in-erest and became maintenance super-isor at the field. It was while he held own this job, in 1944, that he began onstruction of the "Jeep," the number ne prototype of the "Pitts Special" that as to thrill the air show spectators at rlando, Florida in the summer of 1947.

"Jeep One" was built in the garage of ie Pitts home, but when bad doping eather set in, Curtiss Pitts established a eachhead in the kitchen of his house, nd did the dope job on the wings and il surfaces there.

When Pitts finished "Jeep One," the 1945 Miami Air Show was just around the corner, and all that separated "Jeep One" from entry in that show was a test flight and CAA permission to fly "Jeep One" outside the test area. The test flight was successful: it proved to Pitts that he'd attained the sensitivity and lightness of control that he'd wanted. But .... the papers applying for permission to fly "Jeep One" outside the test area did not get an inspector's signature in time for its entry into the 1945 Miami Air Show.

Many pilots flew "Jeep One," and all gave it an enthusiastic nod of approval. The only complaint, and it was mildly given by one pilot and seconded by the designer himself, was that the tiny ship was possibly too light on the controls. Pitts hastened to add, however, that his "Jeep" was not a beginner's airplane, that it was a good, sound airplane that had to be flown .. and preferably by professional pilots.

Curtiss Pitts received many offers for "Jeep One," and when he'd decided he'd learned as much from it as he could, Pitts sold it to a crop duster who'd insisted from the moment he saw and flew it that he could not do without it.

It's doubtful that Phil Quigley ever cried, but if he did it probably was when he was told the "Jeep" has been sold. Phil had been a former flight student of Pitts and had done much of the metal work on the little "Jeep". He'd also done a great deal of the test flying, and so felt a deep attachment to this airplane that had given him his first real thrill of aerobatics. Quigley had 'earned a lot from the "Jeep".

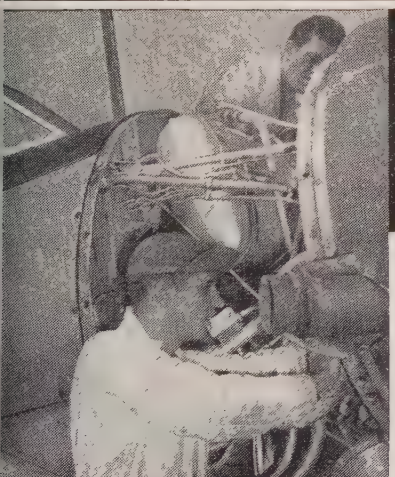
In June or July of 1946, Curtiss Pitts took charge of the aircraft shop at Stengel Field in Gainesville, Florida. Soon after he went to work there, Pitts decided to build 10 Jeeps to test out their sales potential. A scarcity of materials, however, halted this project and Pitts made one "Jeep" instead of 10. This one, though, made up for the "loss" of the other nine.

Improvements built into "Jeep Two" made the pilot-popularity of "Jeep One" seem trivial by comparison. Instead of using a rigid landing gear with large low-pressure tires, Pitts' new "Jeep" had a shock-cord gear with smaller wheels—and wheels pants as an extra. A new and better engine cowling was designed, fuel injection was added, and an Aeromatic prop was installed. Also added was an inverted fuel pick-up system which permitted perfect engine operation in inverted flight. A flexible fuel pick-up line in the tank was weighted on one end, causing it to fall to the low side of the tank (along with the gasoline) as the plane changed altitude.

This was the "Jeep" ... "Jeep Two" ... that your reporter had an opportunity to fly. Like all the others who'd been in on "Jeep One" and then this model, one flight was all that was needed to convince me that here was an airplane designed and built for pilots.

My check-out in the ship was rather unexpected. I was out at the field one afternoon when Curtiss Pitts and Phil Quig-

(Continued on page 53)



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Fly by Omni-Range

(Continued from page 23)

ledo, "IND" (.. -. -..) for Indianapolis, or perhaps adds a voice recording which says cheerfully "This is Wichita Radio." This identification part of the signal will also carry the half-hourly weather broadcasts, and any other voice transmissions.

Since the difference in phase of the reference and variable signals is proportional to the magnetic bearing of receiver from the VOR station, we have only to measure this phase difference to get an accurate indication of bearing. To make this indication even more convenient, it is presented on the scale of azimuths as a reciprocal bearing, showing the bearing *from* the receiver *to* the station.

Tuning knob and dial on the omni-range receiver serve the same function as the tuning mechanism on a low-frequency receiver; only the numbers are different. So you tune in the VOR station just as you would tune in an A-N range station. In your speaker or headset you will hear only a constant station identification.

As you tune in the station, you will probably observe that the vertical needle in the deviation indicator flops off-scale either left or right. Your next move is to turn the knob on the omni bearing selector (sometimes called azimuth selector) until the left-right needle centers. This centering will occur at one of two reciprocal points on the bearing selector scale, so another meter, called a to-from indicator is put in to tell you whether the station is ahead of you or behind you on the radial you have selected.

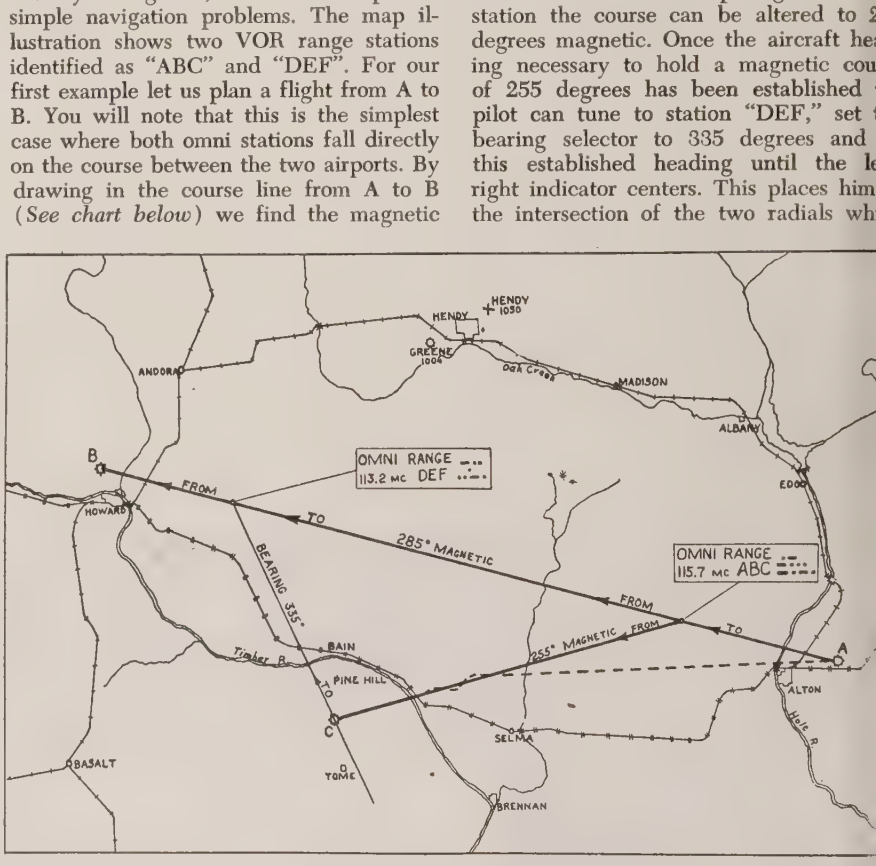
If you are westbound over Cleveland and tune in Toledo VOR, the left-right needle will center when the radial selector points to 270 degrees, and the to-from indicator will show "to". If you leave the radial selector alone and fly a compass heading which lets you drift off course to the left, the "left-right" needle will start swinging *right*, showing that you should alter your heading to the right to get back on course. If you wake up way off course to the left, or south in this case, you may wish to establish a new course by re-centering the "left-right" needle with the bearing selector. So you crank the bearing selector again and find that the course to Toledo from your new position is 282 degrees. This time you watch the "left-right" indicator and "fly towards the needle," keeping it centered by moving the airplane until you get to Toledo.

As you pass over the VOR station, the to-from indicator flops down to "from". Now, if flight along the same course is continued, the left-right needle action is unchanged. Instead of reversing the action of the left-right needle, and requiring a reversal of course corrective action by the pilot, the receiver circuit changes its sensing as it passes the VOR station, and this change is shown on the to-from indicator.

Note that the indication on the instruments is not one of attitude, but of *position*, just as in the A-N range. If you put your airplane in a tight 360-degree turn in the on-course signal area of an A-N range, you will get no change in signal. Similarly in a 360-degree turn at any point within the circular signal area around a VOR station, the indications will remain the same. The omni doesn't tell you where you are pointed—it tells you where you *are*.

A position fix may be obtained from two VOR stations by reading the bearing to each and plotting the intersection on the map. This is similar technique to that employed when using a direction-finding loop, except that the bearings indicated are independent of the *heading* of the airplane, and depend only on its *position*.

In order that you may become more familiar with the use of the VOR in cross-country navigation, let us set up two simple navigation problems. The map illustration shows two VOR range stations identified as "ABC" and "DEF". For our first example let us plan a flight from A to B. You will note that this is the simplest case where both omni stations fall directly on the course between the two airports. By drawing in the course line from A to B (*See chart below*) we find the magnetic course to be followed is 285 degrees.



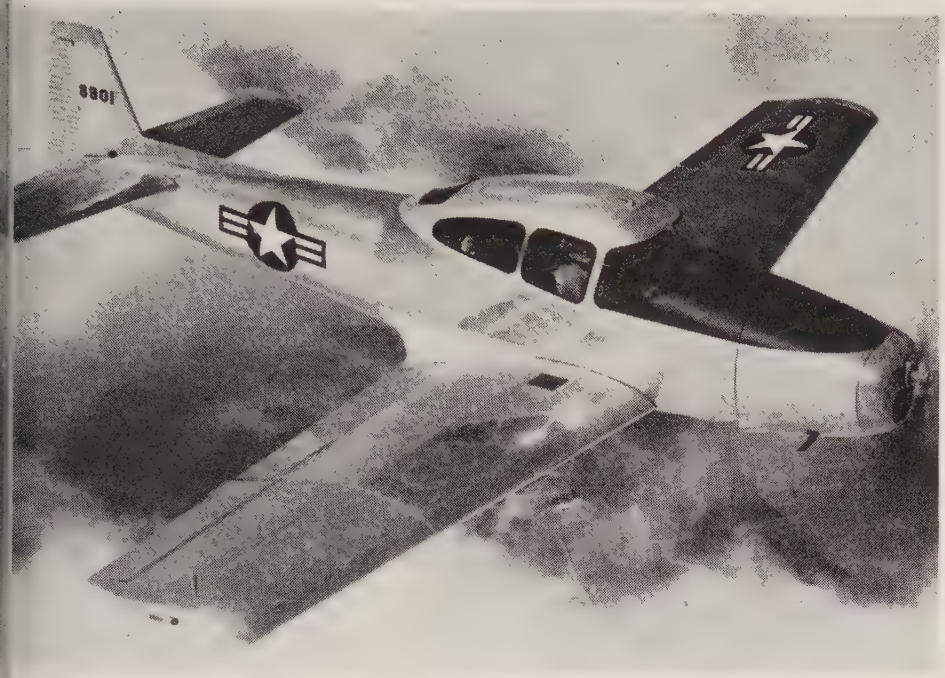
After take-off from airport A, we tune in VOR station "ABC" and note that the left-right needle centers on the selected bearing of 285 degrees. Making allowance for existing wind conditions, a compass heading is flown which will make good a course of 285 degrees magnetic. Certain adjustments in heading are needed to correct for the actual wind until the aircraft is squared away and making good a magnetic course of 285 degrees. By paying reasonable attention to the aircraft heading and to the deviation indicator this course can be maintained across station "ABC" through the "from" signal area and out to the limits of the usable signal from "ABC." At a distance of more than 50 miles from "ABC" at minimum allowable instrument-flight altitude it will be observed that the to-from needle starts to drop back toward the red area in the middle of the to-from indicator. When this needle reaches the red area the signal from station "ABC" will be too weak to provide safe navigation information, and a switch over to station "DEF" should be made. When "DEF" is tuned in it will found that there is sufficient overlap tween the two signal areas to provide liable signal from the new station, the to-from indicator will indicate " Flight is then continued through stat "DEF" using the same procedure u the destination at airport B is reached.

Now let's consider a flight plan fr airport A to C. In this case no omni ra lies on a direct route between the two ports, so two choices present themsel First, a dog leg course can be flown, lowing a course of 285 degrees magn from A to station "ABC". When the from indicator shows passage over station the course can be altered to degrees magnetic. Once the aircraft he ing necessary to hold a magnetic cou of 255 degrees has been established pilot can tune to station "DEF," set bearing selector to 335 degrees and this established heading until the l right indicator centers. This places him the intersection of the two radials wh pass through the airport of his destinati

The omni-range station is located powered so as to provide usable sig strength in a circular area surround the station to a radius of 50 miles in directions at minimum instrument-fli altitudes. As the altitude is increased distance from the station in which signal may be used also increases. course width on an omni-range is de mined by the accuracy of the receiv equipment used in navigating along selected bearing, just as the course wi on the A-N range depends upon the p cision of the aircraft receiver and anten and upon the pilot.

The VOR system of navigation is doubtedly superior to the four-course l frequency ranges. The engineers who developing navigational systems are qu aware that the VOR, on the other ha is not the final answer to the control air traffic. But VOR will certainly m the approval of many of its critics afte has been through the breaking-in per of operation, and will be adequate for traffic needs for some time to come.

AGAIN ARMY BUYS RUGGED NAVIONS



E'S ONE OF THE 4-PLACE *NAVIONS* now in the United States Army service. Except for its military gnia, and certain military equipment, the L-17 *Navion* is the same as the standard *Ryan Navion*.

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Flying Chauffeur

(Continued from page 27)

home of Hormel's "Spam" (and the reason for the "Spam Town" moniker).

The *Navion* has been from ocean to ocean, into Mexico and Canada. It has flown over mountains, across the prairies, across vast wooded areas of the Northwest, and over nearly all of Minnesota's 10,000 lakes. If ever a plane has bored holes in the "wild blue yonder," it's Spam Town."

Mr. Weseman's holdings range from Texas to Minnesota to Nevada. Without a plane he could never manage his business. Take one particular sequence of events a few months ago, for example.

I was with "Spam Town" at McAllen, Texas, where Mr. Weseman has a big citrus ranch. Word came that trouble had developed at his gold mine in Sulphur, Nevada. The pumps on the gold washing machine had broken down, completely paralyzing the mine.

I took off on an instrument clearance obtained from Brownsville, Texas, and flew three hours, 15 minutes, on instruments, and the remainder of the trip on margin CFR. Three hours of flying was done at night, with a driving snowstorm cutting visibility at times to zero.

After changing oil at Austin and completing a few routine checks, I headed west with "Spam Town," accompanied by Cliff Enger, former Municipal Court Judge and part owner of the mine. It was still snowing, but as time and miles flew by, the weather became ideal. We had breakfast at North Platte, Nebraska and, when we landed at Cheyenne, Wyoming, we were certain they'd be serving lunch. But we'd covered that 800-mile trip so fast they were still serving breakfast, so we had bacon and eggs again.

At Salt Lake City and Elko, Nevada, we made refueling stops. Just as the sun was setting that same day (we'd taken off from Austin at 6:00 A.M.), we landed on the big salt flats at Jungo, Nevada, 30 miles from the mine.

In two days since leaving McAllen, Texas, I had covered 3,000 miles.

One of the mine employees picked us up in his car. I never saw a more down-in-the-mouth bunch of boys than those at the mine. By next morning, however, the place buzzed with new enthusiasm. We had decided to take the pump impeller out and fly it to Reno for repairs.

When the impeller was removed, it was discovered that the pump housing also was damaged. We estimated that the whole mechanism to be repaired weighed 500 pounds. But to handle it, two men would have to go along with me. By truck, Reno was eight to nine hours from the mine.

"If we could get the pump into the *Navion,* we could fly it to Reno," I ventured, while wondering just how foolhardy an offer that was.

Well, we struggled with the pump and finally loaded it into the *Navion.* The three of us piled in, and I started "Spam Town" into the wind. The salt bed airport was like glass, and at 4,500 feet elevation with our load, acceleration was somewhat slow—enough to make you wonder.

Everyone held his breath, as the salt bed began giving out. I popped about 20 degrees of flaps and the *Navion* roared off the field with 1,050 pounds of payload. We climbed to 9,000 feet comfortably, and an hour later, we landed at Reno.

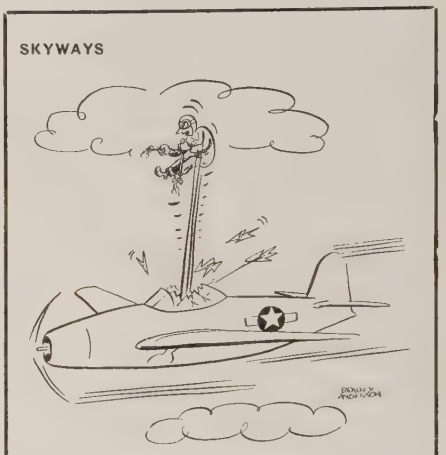
Somehow we managed to get the pump out of the plane and to the machine shop for repairs, which were completed by nightfall. We took off on the return trip the next morning.

As we approached the mine, I spotted a narrow dirt road nearer the camp than the salt flats. Without hesitation, I came in for a landing. A truck was on its way to take aboard the bulky pump, and in a short time, the gold mine was working!

"Gosh, what a way to get around!" was the general reaction of the mine crew.

We hardly had time to draw a free breath before receiving a telegram from Mr. Weseman to hurry home as soon as possible. He had to fly to Canada — to McKenzie Island, Manitoba, to be exact. Any delay would mean arriving after the spring break-up of ice, making a landing there impossible.

I munched cookies while sitting in my shirt sleeves (thanks to the cabin heater) as the *Navion* flew part of the trip at 15,500 feet in temperatures as low as nine degrees below zero. Aided by tail winds up to 90 mph over Wyoming and Nebraska, my ground speed at one time reached 234 mph. Because darkness was coming fast, I called Mr. Weseman and he agreed to meet me at Mason City, Iowa.



The barometer was dropping rapidly, and by the time I reached Mason City, visibility was down to a half-mile, with ceiling at 400 feet. Clear ice had collected on my windshield and wings. Seeing out was very difficult, so I slowed the plane down, dropped the wheels and opened the canopy.

"Spam Town" settled on the runway smoothly despite a 45-mph, 60-degree crosswind. I had picked the first runway I saw for fear I might lose sight of the field and never find it again.

It had taken only eight hours, 10 minutes to fly from Sulphur, Nevada to Mason

(Continued on page 58)

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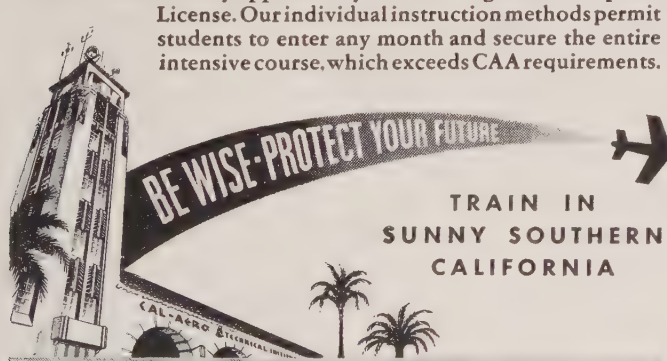

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Photo Flight

(Continued from page 25)

satisfactory. All low-winged planes are tough to shoot from since they must be banked steeply to give the cameraman a shot at the ground. A good camera ship should have large sliding windows since shooting through plexiglas causes distortion, reflection and fuzziness in the negatives. Mufflers are a must for any close-to-town flying. And don't miss the obvious precautions: plenty of gas, oil and a smooth-running aircraft. It usually happens that pictures are taken over spots where forced landings would be rough, so make sure that the airplane is in top mechanical condition.

In a tandem plane the cameraman usually should sit in the rear seat. There is a baggage compartment close at hand where he can store extra film holders and the other mysterious gadgets of his trade. From the back seat a fast-working photographer can get two shots on each "pass" over his object, one in front of the struts and one behind them. Anyhow, the visibility is better for the pilot in the front cockpit.

Pilots will find that most photographers want to fly either in mid-morning or mid-afternoon. The shadows on the ground are better for their pictures at that time. Noon light produces flat appearing prints.

A short preflight talk will bring out just what the photographer wants and will save frantic shouting in the air. The pilot should be sure of what the guy with the camera wants, from what height and angle, and then try to put the *Cub* in exactly that spot.

The correct altitude for air pictures depends on many things: focal length of the camera lens, size of the object to be photographed, forced-landing spots available and the nearness of obstructions. Even though the cameraman requests it, never fly lower than seems safe. He doesn't know that he is sticking out your collective necks. Five hundred feet is low enough for nearly all pictures.

Over downtown Hollywood, California, one day recently, this writer was shooting pictures of a new hospital. Pilot at that time was an old-time flight instructor who had spent the past two summers in a crop duster. In answer to the remark, "It's your license. Go as low as you feel comfortable," the pilot turned around and replied, "Remember what I've been doing for a living the past two years!"

When flying at these minimum altitudes, it is smart to keep even throttle settings, make shallow turns and generally be as inconspicuous as possible. It is surprising how few people will bother to gaze skyward at a low-flying plane that is flown conservatively.

It is easier for the cameraman to make good shots if the plane's flying speed is kept to a minimum. There is less vibration, less wind to buffet the camera and more time to get a series of photos if the *Cub's* speed is cut to about 50. During these partial-power stalls, full carburetor heat is a *must*. It isn't a bad idea to apply carburetor heat as soon as the bottom door is opened and leave it on for the full time the photographer is shooting.

In many photo jobs—shooting subdivisions, ranches, schools and large buildings—the photographer will request that a street in the foreground form the bottom of his picture and the middle of the structure be in the center of his sights. Once lined up at the right angle, the pilot should maintain a forward power-on slip to the right so that the photographer may shoot around the nose of the plane as soon as the image is close enough to fill his negative. It sounds simple, but surprisingly few pilots can get the job done.

Remembering the old axiom that the pilot is responsible for his passengers, it is a good idea to keep an eye on your back-seat photographer. Some of these shutter-bugs are really eager guys and may take chances without realizing it. Many photographers in *Cubs* fly with their safety belt very loose and one foot resting out on the wing strut. In that way they can lean out farther and get a clearer view with their cameras. True, this system works, but it isn't too safe.

Camera equipment, too, should be anchored to either the photographer or the plane. Leather straped carrying cases on small camera are satisfactory, but a strap or piece of rope should be attached to larger cameras and tied securely to the plane. And, just in case, aerial insurance is remarkably cheap.

Many times photographers will want to photograph large crowds at parades, football games and county fairs. Remember the CAA's "Thou shalt not's" and fly to one side of the crowded area, *never directly over it*. If the photo assignment is very important; for a newspaper, chamber of commerce or pageant committee, contact the local CAA office, aero squadron or police station and tell them what you are planning to do. Give the estimated time of the flight, type of plane, color and for whom the pictures are to be taken. These agencies are cooperative to a degree, and will not file low-flying violations if they know in advance that the photographer has a bonified assignment. However, don't take advantage of the situation and do a buzz job. They can still throw the book at you if they wish.

In shooting low-altitude pictures, the pilot should have some sort of a forced-landing spot in mind at all times. Football stadiums, baseball parks, parking lots and golf courses are possible sites. During a photo assignment, this writer once landed on the Brookside Golf Course adjoining the famed Rose Bowl in Pasadena, California, when the single magneto of an old 40-hp *Cub* fouled out. A mechanic from the airport filed down the points and the plane was flown off the fairway.

There is a small but steady income for the pilot who can build up a reputation among the shutter-bugs of being able to put them where they want to be on their first pass over the area. If a photographer is going to do any amount of flying, he would naturally like to know a little something about the mechanics of flight. A little flight instruction thrown in while flying to and from the picture site might easily line up a prospective student for the local airport.

Anyhow, it is a good, inexpensive way to get some interesting pictures to put on the walls of the pilot's room.

Dilbert

(Continued from page 37)

you be on the alert to recognize the symptoms. Better yet *stay below 10,000 feet!*

They Still Don't Mix—Modern chemists can mix substances today which produce results beyond the most fantastic dreams of the alchemists of the Middle Ages; everything from nail polish to atomic energy. But even these savants haven't learned how to combine alcohol and gasoline without getting an explosive mixture. Certainly, no aviator should try it!

Many an aircraft accident can be traced directly to the man who tanked up on alky the night before and then thought he was Superman the next day.

No wonder! The after-effects of alcohol are very similar to anoxia. Not the anoxia which causes unconsciousness, but that tricky, sneaking partial anoxia which des-

troys good vision, good judgment, and split-second reactions. At 5,000 feet, a tough "night before" is apt to affect you.

The old rule, "No drinks within 24 hours of a flight," still holds good. Sure, a lot of pilots have broken this rule and gotten away with it. But it's wiser to remember the many good ones—pilots better than either you or I—who aren't flying today because they ignored the rule.

Induction System Icing— In order to prevent icing in the induction system it is necessary, first, to recognize potential icing conditions, then to know how to handle your heat.

Recognition becomes easier when you know that carburetor icing occasionally occurs when outside air temperatures are as high as 85° F. This seeming impossibility is explained by the big drop in temperature which takes place as the gas is vaporized. That is why you can run into carburetor icing in the summer as well as in the winter, spring and fall. The main temperature danger area is between 40° and 75° F., depending on the moisture content of the air. So watch that humidity and learn to recognize the temperature-humidity danger areas

How handle your heat? If you have an exhaust pre-heat system, it will furnish air so hot that you turn it on only to the extent needed to melt the ice. Pilots accustomed to this system, however, are sometimes prone to use the alternate air system the same way; that is, turning it on only part way. This is a big mistake. The alternate air system merely supplies warm, relatively dry air from behind the cylinders. While the humidity of this air is low enough to prevent ice from forming in the induction system, it is not always sufficiently hot to melt ice once it has formed.

To be safe, therefore, alternate air must be turned on *before* entering any weather where there is possiblity of icing. Also, to be effective, it must be turned on *full.* Latest design alternate air systems make it impossible to lock the control in an intermediate position. Once you learn to recognize potential icing conditions, and use your alternate air system correctly, you will find it a very effective method of preventing ice from forming.

Any time you experience loss of power, icing must be suspected, for this is one of the first symptoms. In an emergency where ice has formed before you are aware of it, it is well to know that reducing engine power will sometimes stop icing before it becomes dangerous. Also, for use with small horsepower engines *only,* setting the mixture control at "full lean" may cause the engine to spit back through the air scoop and blast the ice out.

If your induction system ices up and you can't get rid of it, land in the best available space while you still have enough power to control your plane. If your induction system has no preheat equipment, stay out of icing weather.

Pint-Size Racer

(Continued from page 47)

ley called me over to the "Jeep" and asked me to "put it on." No one gets *in* the "Jeep . . you "put it on." As I tucked all 6-foot 4-inches of me into the small cockpit, I began to sense that the thrill I was about to experience would far exceed that of my first check-out in a so-called "hot" fighter plane. My senses weren't wrong.

I taxied out onto the rough field, fully expecting to get a brisk bouncing around in such a small ship.

But taxiing was my first surprise . . . the wings rocked up and down as though I were taxiing at a 45° angle across furrows, but I sat as neat and unruffled as a biddy in a rocker. The "Jeep's" excellent landng gear absorbed practically all of the roughness. On take-off, my path made like a snake until I got accustomed to the sensitivity of the controls. Then, almost before I had full throttle on the little "Jeep" was in the air and we were on our way . . . up. I tried to lay off the controls as much as possible, but it took me a while to get used to their lightness. I guess I was so accustomed to the heavier control pressures needed on the usual run of lightplanes that I couldn't break the habit quickly. Over-control was my middle name.

In a very few seconds . . or so it seemed . . . I had the "Jeep" up to 3,000 feet. I did a few stalls, a spin recovery and then began to just play around. The "Jeep" gives you the feeling right off the bat that she isn't made for just right-side-up flying. I slow-rolled her, did a snap roll or two, and a couple of inside loops. What a treat it was to roll a ship over without the engine's missing a single beat. That's what Pitts' inverted fuel pick-up system made possible.

When you first fly the "Jeep," the size of her is apt to worry you. You feel as though you could reach out and touch the wing tips or rudder, and you wonder what's holding you up. But when you feel out her performance and get to know her a little better, all feeling of wonder disappears and you start trying to figure out how the family budget will stretch to permit your owning a "Jeep" for yourself.

The glide of the ship might be comparable to that of the 85-hp *Swift.* Since I own an 85-hp *Swift* and have flown it alongside of the "Jeep" several times, I suppose it's natural for me to compare the performance of the two ships. The comparison certainly shows the great amount of performance that can be put into a single-place airplane for the same power. For example, the "Jeep" will fly along under good control when the *Swift* is stalled with flaps down, and the "Jeep" cruises a good 15 mph faster than the *Swift* at the same per cent of power. When it comes to climb, the "Jeep" goes way out in front with its 1500-fpm rate. It has a 200-foot take-off run, too.

For sport flying, as far as I'm concerned, the "Jeep" is it. It's really the ultimate in power planes for aerobatics. But don't sell it short for cross-country flying, either.

(Continued on page 58)

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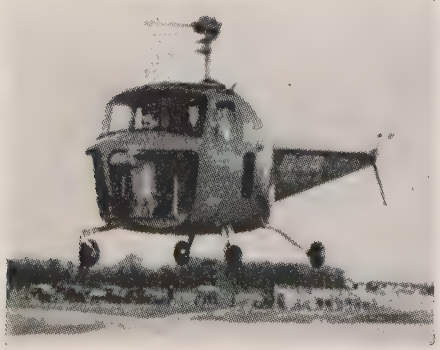

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Shoulder Harness

(Continued from page 29)

When Lieutenant York's F-80 first came in contact with the ground, it was traveling, according to Air Force officials, about 100 mph. The ship slid and rolled between 200 and 300 feet before coming to rest against a six-foot dirt bank at the edge of a tract of timber. The ship was equipped with a shoulder harness, and this along with the seat belt, was locked tight before impact, holding the pilot firmly in the seat. *"They caused no bruises due to the fact that the pilot had them locked very tightly."* Remember this last statement, because we're coming back to it. Many pilots are under the misapprehension that a tight safety belt is not safe.

Lieutenant York says that although his saftey belt and shoulder harness were locked tight, his head beat against the canopy during the time the plane was sliding—after it hit the ground and until it came to rest. He was wearing the new one-piece crash helmet which is to be used in all fighter aircraft. It was split laterally, for about six inches, over the left earphone—which is added testimony to the severity of the crackup, and further substantiation to the conclusion that with reasonable protection, severe accidents *can* be survived.

Crash Injury Research began in 1942 after Hugh De Haven, an industrial-design engineer and pilot, had approached Jerome Lederer, who was then Chief of the CAB Safety Bureau, with this idea: When a plane crashes, the government makes an investigation to determine the cause of the crash. If there is evidence of structural failure, or that the plane is aerodynamically unsafe, the government requires the manufacturer to make changes in the craft. If on the other hand, the crash is attributed to pilot error (and most of them are), then there is little in a preventive way that can be done. Why not, De Haven asked, try and determine what kills one person and leaves another uninjured in an accident? He further reasoned that some causes of dangerous injury could be eliminated by design.

Human beings can't be exposed deliberately to severe crash force. It's too dangerous. Consequently, if we are to understand the causes of crash-injury, we must study cases where persons are exposed to severe force accidentally. Thanks to CAA, CAB Accident Investigators and to State aviation officials, Crash Injury Research is getting more and more detailed accident-injury reports for studying the problem of safety and danger in accidents.

To show what these reports indicate, let's examine a couple:

In one lightplane crash that at a glance would not have been called severe, the pilot was only slightly injured, yet the passenger in the rear seat of this tandem plane was killed. Evidence showed he did not have his seat-belt fastened, and was consequently thrown over the pilot's shoulder. Death was caused by his head striking a tube cluster. The pilot had his seat-belt on, but this did not keep his head from moving forward and striking the instrument panel. Fortunately, the panel that the pilot's head hit, was made of soft metal. It gave with the shock and absorbed the blow. As a result the head injury was not severe. This pilot was lucky. Because in this, as in nearly *all* survivable airplane accidents, fatalities are due to *head injuries.*

In a study of 596 persons involved in severe aircraft accidents, 483 received head injuries of either a serious or fatal nature. In 149 cases the seat-belts failed. In 164 cases, although the seat-belt held, it did not prevent the upper part of the body from moving forward, and the head from striking some object. Another study, of 89 critically injured persons, showed that in 59 cases, the *only* dangerous injury was to the head.

When De Haven himself crashed in a *Jenny* back in the first World War, he didn't have a shoulder harness. But he avoided a serious and perhaps fatal injury by the simple expedient of putting his arm against the instrument panel and resting his head on his arm. In this way, when the crash occurred, his head slowed down as the ship disintegrated. He thus avoided high-velocity impact—and a head injury. This is a bit of advice we can all remember. We also should remember the old bush pilot's admonition: *"If you're in a tight spot, fly the airplane until the last split second. It's much safer to break a wing off horizontally with a plane close to the ground but under control, than it is to hold the ship off, possibly stall, and dive into the ground vertically."*

Crack-ups of a sliding or cartwheeling type need not be dangerous. Forces in this type of crash are low, and injuries are sustained principally by those parts of the body that do not decellerate, or slow down, at the same rate as the cabin. That's why it's important that a safety belt be tight and that shoulder harness be worn. That's why the F-80 pilot's crash injuries were so trivial. His seat belt and harness made him a part of the airplane structure. *As the plane stopped, his body stopped.*

In lightplane accidents, where shoulder harness is not provided, when the plane stops the upper part of the body is unrestrained, and moves forward with the full velocity of the crash, striking into parts that have already stopped. If the object won't dent, the head will.

As a shoulder harness is difficult to anchor in some ships, and where available often will not be worn by careless pilots, safety measures in addition to the shoulder harness are now being recommended.

It's proposed, for example, that the instrument panel be made of soft metal that can yield and absorb blows that otherwise would smash a person's head. Cockpit structures should be made so they buckle away from the occupants of the plane instead of into the cabin. It's desirable that pilot and passenger be seated as far aft as possible in small ships.

The present arrangement of some personal planes is a virtual "man-trap" in accidents. For with engine, gas tank and instrument panel, one right behind the other, the pilot is likely to have these structures pushed back in his lap in accidents where the forward section takes

the crash force. This is usually the case.

Forward sections of lightplanes should be designed not merely to support the engine but to absorb more of the crash force to protect the cabin and its occupants. Another recommendation is that control wheels be designed to support crash loads, and be curved to distribute loads properly over a person's chest. In tandem planes, according to CIR, control sticks seldom cause the injuries that might be expected. In nearly all cases studied, the force of the crash threw the stick forward, away from the pilot.

It's interesting to note that in the crash of Orville Wright and Lt. Selfridge at Fort Meyer, way back in September 1908, Lt. Selfridge died of a head injury sustained when he hit a solid wooden upright in the framework of the ship.

If we had known then what we know now about injuries in aircraft accidents, perhaps hand in hand with aviation progress would have come developments that we now find necessary to give the pilot more than just a slim chance of surviving a severe crash.

According to another accident-injury report, a pilot was flying his friend in a side-by-side dual-control ship. They hit some power lines and dove into the ground from 30 feet up at an estimated 50 mph. The engine was buried in the ground about six inches. Both occupants of the plane survived, although the average crash force was estimated at 27 G's. In other words, the force of the crash imposed an additional weight on the occupants amounting to 27 times their own weight.

The pilot was not using his safety belt, or else it was not secure, and he was seriously injured. His passenger, seated alongside, received trivial injuries. This was an informative accident, for the passenger who weighed 215 pounds had his seatbelt on tight. Yet he did not suffer any internal or other serious injury.

This recalls the F-80 crash and the seatbelt and harness that caused no bruises because the pilot had locked them very tightly. There is *no* evidence that tight seat-belts or tight shoulder harness will cause injuries. They cannot cut the body in two as some people believe. Possibly, in accidents of great severity where all but the cockpit is destroyed, a shoulder harness might cause bruises or break a collar bone. But without the harness, a person in such a crash rarely would survive.

More and more we realize that the human body can stand forces in excess of what the airplane structure itself will stand. In cases of freefalls onto hard ground, De Haven has examples on record where a human being was stopped from a velocity of 50 mph within a distance of six inches, without dangerous injury.

An analysis of injuries shows that among 102 survivors of lightplane accidents where seat-belts failed due to the strain imposed, only two persons showed any evidence of internal abdominal injury.

Research carried out by the Naval Medical Research Institute shows that seatbelts being broken in these accidents, give a snubbing action in the order of 2,000 pounds. And still, instead of causing injury, the belts provide a high degree of protection to the body, between the chest and knees. They prevent rapid movement of the central portions of the body toward dangerous objects. What's needed for "real" protection, is an additional chest-belt or shoulder harness to prevent rapid movement of the upper portion of the body toward dangerous objects.

The Navy and Air Force did not adopt the shoulder harness as standard equipment until after the start of the past war, and long after RAF pilots had proved by experience how valuable such a harness can be. Now, by observing and recording accident results during the war, the Air Force and Navy have increased the strength of the seat structure and shoulder harness. The Navy's new seat structure with belt and harness, is designed to hold 8,000 pounds in a 40-G crash.

Plans are underway to increase the holding strength of civilian seat-belts, which up to the present have been designed to hold up to 2,000 pounds. Military seat belts are designed to hold up to 5,000 pounds. It's not sufficient to raise the strength requirements of safety belts in civilian planes, if the anchorage points are not designed to carry heavier loads.

De Haven believes that belts and anchorages would be provided that will hold until the force of the crash destroys the surrounding cabin structure. Anything less, he feels, "may in the long run be short-sighted and costly."

In military aircraft the harness anchorage point will vary depending on the design of the ship. However, all harness operate on the same principle. A light coil spring is used to hold the harness snugly to the pilot, leaving him free to move in the cockpit. The anchorage point of the harness is usually in the armor plate, near the pilot's shoulder blades. The harness comes over the shoulders and attaches to the tongue of the seat-belt buckle. Thus, when the seat belt is released, the shoulder harness is released, too.

On most fighter aircraft today, the pilot moves a lever at the side of his seat to lock the harness tight. The only difficulty with this arrangement is the pilot may have his hands full in an emergency, and usually does not have time to think much about locking his harness.

Consequently, an inertia lock is being installed in new fighter planes. Developed at the Cornell University Medical College during the war, the inertia lock immediately locks the harness whenever a sudden force is applied to the ship. A manual-locking device is provided in addition to the inertia lock.

Private flyers who want optimum safety in flying, and who understand the "fire-net" protection provided by shoulder harness in conjunction with seat-belts, are welding and bolting in anchorage points for harness equipment that the manufacturer will ultimately provide.

"Do Pilots Need Shoulder Harness?" The evidence from crash reports says they do—and the sooner all planes are equipped with them the better.

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(Continued on page 58)

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(Continued from page 57)

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Flying Governor

Read the story of air-minded Michigan's air-minded Chief Executive Governor Kim Sigler

in

November SKYWAYS

Pint-Size Racer

(Continued from page 53)

When burning about five gallons of gas per hour, the "Jeep" cruises at 132 mph and has a range of 400 miles. Perhaps its only drawback is its lack of baggage capacity . . . limited to 15 pounds.

Very recently, Curtiss Pitt told your reporter that he was installing a 95-hp Continental in the "Jeep". The 85 and the 95 weigh the same so the results are bound to be an increase in performance. An inverted oil breather and trap system is being installed with this new engine to prevent loss of oil through the breather during inverted flying.

After all this about an A-1 aerobatic airplane, it's too bad to have to add that the ship is not going to be put into production, nor will the plans of it be made available to the public . . .unless, of course, someone comes along who wants to finance an airplane factory. If that person comes along, then a real single-place airplane, not a puddle jumper, will be available. What the cost would be is another question, present-day price scales being what they are. Curtiss Pitts estimates it cost him $2,000 to build "Jeep Two," complete with new engine. Whether or not it could be built in quantity for that, only production experience could tell. For the sake of pilots who long to own a real single-place airplane, your reporter joins a long list of others who hope that a producer for "Jeep Two" does come along. single-place airplane, however, your reporter joins a long list of others who hope sincerely that a producer for "Jeep Two" does come along—and soon.

Specifications

Engine	Continental A-85, or 95 — fuel injection
Propeller	Aeromatic P-200
Span	16 ft. 9 in.
Length	14 ft. 3 in.
Height	5 ft. 7 in.
Fuel	19 gallons
Baggage	15 lbs.

Performance with 85 H. P. Engine

Maximum Speed	152 mph
Cruise 75% Power	132 mph
Stalling Speed	50 mph
Rate of Climb	1500 fpm
Range Full Load	400 miles

Flying Chauffeur

(Continued from page 50)

City, Iowa — 1,680 miles at an average speed of 203 mph!

When Mr. Weseman and my wife finally arrived, I could see lines of worry on their faces. It had taken them one hour, 45 minutes to drive 52 miles in the snowstorm, and all the time they wondered whether I'd get down safely. Later we learned that I had hit a cold front which had brought Mason City the lowest barometric reading in its history.

As "flying chauffeur" for one of Minnesota's busiest men, my flights aren't always as packed with as much urgency as these. During the summer, I may be called upon to get "Spam Town" ready for a dawn take-off, but we'll be heading north on a trip of 300 or more miles to such towns as Cooke, where the air strip is a short, very rough field surrounded by pine trees. Armed with rods and reels, line and tackle, Mr. Weseman and a friend or two are in the boat before you can tie on your leader. They head for the "narrows" where the Walleyes are biting.

What a life! No telephone calls, no people asking for the busy executive, no meeting to attend. In mid-afternoon, we return to the lodge loaded with our limit. We steak the fish, put them in fish cans, drive to the fields and in another two hours or so, we're back in Austin.

Besides numerous business uses, the *Navion* is employed for various other purposes. Last summer, I flew the "Queen of Austin," Miss Marjorie Shaw, to the Aquatennial in Minneapolis. where we were met by Mayor Hubert Humphrey. Last spring, Mr. Weseman, Mayor T. B. Rockne of Austin and City Councilman David Neiswanger, chairman of the city airport committee, flew in "Spam Town" on a survey of newly established airports throughout Minnesota. We made the trip in six hours' flying time, and the inspection of shops, runways, hangars, restaurants, etc. resulted in ideas on how to improve Austin's facilities. Now Austin has three runways near completion.

Like any other chauffeur, I take pride in my vehicle, especially if it gives me something to crow about. I like showing the ship off. At the Nevada gold mine, I often set the plane down on a little cow trail of a road, just about two feet wider than the tread of the wheels. This has frequently been done in a 20- to 40-mile crosswind.

As for economy, I can equal the record of any big limousine chauffeur. A typical trip from Austin to McAllen, Texas, 1,215 miles, is done at an average speed of 154 mph, with gas mileage 12.6 miles a gallon, and oil consumption a total of one quart. Typical cost for the trip—$29.86.

Little wonder that men like Mr. Weseman, with such far-flung interests, find their private planes as indispensable in these post-World War II years as the businessmen after World War I found cars.

Yes, times do change. As Mr. Weseman points out, and I can readily confirm:

"From a time-saver standpoint it can't be beat. A car couldn't cover in a year what a plane can in three months."

PICTURE CREDITS

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TERRAIN *Flying*

THE concluding section of the CAA's booklet, "Terrain Flying," is herein offered the pilot-readers of SKYWAYS. Part II contains valuable tips on flying over swamp areas, desert regions, bad lands, forests and frozen wastes, cities and towns, and finally, Mexico. The navigational advice presented was obtained from veteran flyers versed in pilotage over these types of terrain.

TERRAIN FLYING

Part II

Swamp Areas

Swamps are pretty dismal places to land airplanes. They are inhabited by nasty little insects, bugs, snakes, and assorted venomous reptiles; and besides, there is usually somebody wandering around shouting "Chloe." It's hard to find airplanes that have gone down in swamps—still harder to find the people who were in those planes. A little care in flying over swamps will pay big dividends—so will a little carelessness. In one case you get comfort—in the other, misery.

Our biggest swamps are in Florida and Louisiana, but there are swampy areas in other places which you profitably can avoid: along the eastern seaboard, in Georgia, Virginia, North Carolina, and Mississippi.

There is no safe way to fly over swamps—at least over swamps of such size that the pilot must be, at any time, many miles from its edge. Forced landings can be made, but the real hazard is survival and rescue thereafter. By far the best practice is to skirt swamps and stay in the close vicinity of a highway or railroad, even if this involves adding miles to the flight.

William O. Lazarus, an SLP (Senior Local Pilot) who is aviation supervisor for the State of Florida, has a good piece of advice for a swamp landing if one should become necessary.

"In searching for a safe landing spot while flying most anywhere in Florida, Georgia, or other areas where cypress swamps and pine lands exist," he says, "consider carefully the area between the cypress and the pine. You will generally find any cypress swamp surrounded by an area where neither cypress nor pine trees grow. The area will vary in width from 30 to 100 feet or more, depending upon the slope of the ground and other features.

"This area is grass-covered and usually very smooth as it is the overflow area for the swamp. When the water is high in the swamp, a few inches of water floods this area and discourages the growth of pine trees. Most of the year it is dry and firm so that Cypress will not root in it. This is the best—perhaps the only—place for an emergency landing in a swamp."

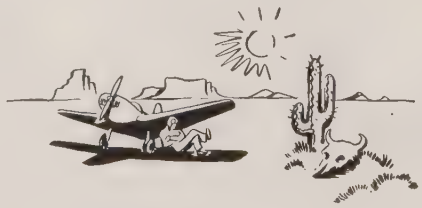
Carl Clifford, CAA man quoted earlier *(Part I, Sept. issue)*, warns that the Florida Everglades, the Okefenokee Swamp in southern Georgia, and the coastal swamps along the Atlantic and Gulf Coasts and the swamp area just north and east of Mobile are to be avoided. He points out that ocean coast lines make for easy piloting, but he advises keeping close to highways along the coast line near Charleston, Savannah, and Brunswick. Down the east coast of Florida, he says, navigating is absurdly simple, but he insists that the novice pilot, when flying any other direction from Jacksonville except along the coast should follow closely a highway or railroad and thus avoid the worst swamp areas.

Lazarus suggests that any pilot who becomes lost in Florida should fly due east or west; by so doing he will arrive at the coast line within an hour, even in a slow airplane.

"From Miami," Clifford points out, "there are only three routes available to the novice: straight north along the shore line; straight west following the Tamiami Trail to Ft. Myers, Tampa, and St. Petersburg; and southwest to Homestead and Matecumbe Key; thence west-southwest to Key West, following the Key West highway. Beyond Key West is Havana with a 90-mile water hop for the more adventurous.

"From Ft. Myers, St. Petersburg, Tampa, Lakeland, Orlando, and central Florida towns, no mountains will be encountered in any direction, but sizeable swamp areas abound. The novice will be wise to find a highway or railroad leading in the desired direction and to stay close to it."

Nobody in the SLP category loves swamps. They are not even pretty or interesting to fly over, it seems. William M. Berry, the CAA's personal flying man for the Fourth Region, points out that timbered and swamp areas are encountered in Louisiana and Arkansas. He strongly advises novices to fly the established airways where intermediate fields are available, or to follow very closely the main highways.



Desert Regions

Desert flying has its beauties and its dangers, too. Wind and sun and lack of water are the natural enemies. Take care of the dangers they present and curb the human impulse to do wrong things; then you will enjoy desert flying.

Every SLP we have talked to has stressed the very great importance of pilot behavior in the event of a forced landing in the desert. They all point out what an insignificant appearance a lone man makes on a vast desert when someone in an airplane is searching for him.

Their unanimous advice is that pilots, whether they are veterans or novices, stick to the traveled routes, whether they are airways or highways or railroads, when flying over deserts. That involves filing a flight plan, of course; and this you will always do, if you're smart.

Then, if you're forced down, *stay near your airplane.*

"We cannot emphasize too much," says Marshall Beeman, CAA's Sixth Region expert, "the necessity of carrying water, chap lipstick, zinc ointment, cap with sun vizor, and dark glasses during the summer months. Always fly close to the highways. Always file a flight plan, and always stay with the airplane in the event of a forced landing. You cannot survive the desert heat for long in the direct rays of the sun, and you should stay in the shade of the airplane until help arrives.

"Likewise, in flying in mountainous and desert regions in the winter, adequate clothing is vital because of the freezing temperatures encountered at these high altitudes. Even in summer, desert temperatures at night are uncomfortably low."

With 3,500 hours of desert flying behind him, E. N. Sturdivant cautions a solid respect for the desert:

"It's much better to stay close to a highway or railroad so that, in case of forced landing, you will be near civilization and not liable to perish for lack of water. Sometimes you can even see houses in the distance, but in case of forced landing, it's very doubtful if you would live to trek across the desert in the midday without water. A few people who don't know the desert and how they can be fooled by distance, may think they can walk 15 or 20 miles across the desert without water, but few will survive the experience. I keep a gallon of water in all my ships when they leave on XC's, regardless of where they are going."

An SLP in the Sixth Region has some specific advice on the subject of desert wind conditions:

"There is an old axiom that says 'What you don't know won't hurt you,' but desert-flying pilots should revise this to read: 'What you don't see may hurt you.' I refer specifically to the thousands of small 'whirlpools' or 'twisters' encountered over southwestern U. S. deserts.

"In flight, you can spot these 'twisters' miles away, as they spiral upward with a characteristic column of sand, dust, and even small twigs and grass. The birds also can spot them, and you will see hawks and buzzards nonchalantly riding these rising and twisting currents of air to great heights. These birds are merely riding the thermals for enjoyment.

"However, even if you do have wings, don't emulate these birds. Stick to your aeronautical chart. After all, if one of the birds fails to get home on time no one will worry; if you fail to arrive on time, it will give us local pilots a lot of trouble buzzing around these barren wastes looking for you. So when you see those 'twisters,' admire them all you want, but alter your course to miss them."

This pilot says there are "twisters" which you cannot see. It's very embarrassing to have one flip your plane over and pile it up on on the ground while you are taxiing or if you encounter one near the ground. At least you can salvage your pride somewhat by avoiding all those you can see.

When landing, he advises, watch for these little disturbances on desert airports. If any are in evidence, land on the dirt surfaces because there they are most

visible and can be avoided. You cannot see them on a concrete runway. Keep plenty of control and speed. Both will help in case a "twister" jumps you.

As with mountain flying, desert flying has its enthusiastic boosters. Glen L. Engle, Indio Airport, Indio, Calif., points out some of the pleasures of desert flying. In his opinion, one of the nicest features about flying in the desert regions is the fine weather that prevails almost the entire year. By fine weather he means absence of haze, smoke, and precipitation. The visibility is generally excellent to the extent that distances are deceiving. A landmark or range of mountains, while appearing close, actually may be perhaps twice the estimated distance from the observer.

A. R. Mortensen of Hinckley Field, Ogden, Utah, in describing the country between Ogden and Elko says this is mostly typical Nevada desert, except for the 50 miles between Elko and Wells, Nev. He assumes the pilot is following the Southern Pacific Railroad and points out that about 10 miles west of Ogden, on the shore of the great Salt Lake, this railroad "goes to sea."

It crosses the lake on a combination of earth fills and trestle bridges. The first part of the lake, between Hinckley Field and Promontory Point where there is an emergency field, is generally shallow and safe to cross at lower altitudes. The major portion of the lake between Promontory Point and Lakeside reaches a depth of 40 feet, and it is advisable to fly at an altitude which would enable the pilot to glide in for a shore landing in case of total power failure. The safe altitude is generally considered to be at least 8,000 feet, which will give 4,000 feet clearance between the airplane and the water. At this altitude, with the conventional airplane, the time in the middle of the lake at which it would be impossible to glide in can be measured in seconds.

In the event of a forced landing in the lake it would not be impossible to land on the railroad trestle as it is wide enough to support double tracks at several points. The water in the lake is 20 per cent salt, and an attempt to swim at excessive speeds, dive or splash would result in strangling. By merely drawing the lower part of the legs upward it is possible to sit in the water and float like a cork with the head and shoulders protruding. In warm weather a person might float indefinitely.

The advice already given on planning mountain and desert trips in the early morning holds very strongly for most flights in our desert areas; from Salt Lake to Elko to Reno, Salt Lake to Las Vegas to Los Angeles, El Paso to Tucson to Phoenix, etc.

Flying across southern Texas offers no particular hazard, the terrain being low and smooth. In the western section, however, the State has lots of hill country, covered with timber, mesquite, sagebrush, and sand dunes. Human habitations are few and far between, a good argument for sticking to the highways where rescue will be easier in an emergency.

Novices in desert flying should count on much longer runs for take-off and longer

rolls in landing as a general practice. Many of our deserts are at fairly high altitudes; and all of them, of course, run high temperatures. Both conditions affect seriously the performance of any airplane, and there are many opportunities for pilot error.

No formula has been worked out in a simple enough detail for use in this kind of flying. The novice is pretty much on his own in his first landing on a high field, or a hot desert field. At his first chance, he should come in "hot" with lots of control and immediately discuss this change in flying conditions with a pilot familiar with desert flying. Having learned from him the fundamental differences, the novice ought to familiarize himself with the behavior of his own plane under the new conditions. Heated and rarified air is no friend of a pilot.

Generalities about desert flying are not enough. There are routes over deserts which may be poison to the lightplane with short range. Take this terse description by Marshall Beeman of the straight-line route between Tucson and San Diego.

"This route is not suggested for light aircraft in summer months due to high winds, terrific turbulence, up and down drafts, coastal fogs, and the distance between service facilities. Suggest route be planned instead via Phoenix, Blythe, Los Angeles, and San Diego. If trip is necessary, suggest it be planned in early morning hours taking into consideration winds aloft and fuel supply aboard, after complete check of coastal weather information."

That ought to be enough to warn the novice to check in advance with an SLP on every flight attempted over desert country.

Bad Lands, Cut-Over Lands, Forest, and Frozen Wastes

These conditions are spotty. In general, only forests occupy very large areas and they present their particular hazards to the novice pilot. Perhaps you have flown along and contemplated the fluffy green carpet of a forest beneath you, thinking it ought to be a soft and safe place to land. If it were all leaves it would be, but there are big limbs and tree trunks in that mattress, and tree landings must be listed as dangerous and expensive. In all but a few such areas there are small open fields in which an emergency landing can be made. When flying over all the others, the novice pilot should seek the advice of an SLP and listen very attentively to him.

Bad lands, excepting perhaps those of South Dakota, are rather limited in area, and they can be avoided. There is no reason, in fact, for flying directly over the middle of any very bad stretch of country. You can always go around—it may stretch your flight, but it also will stretch your span of life.

Cut-over ground is bad for airplanes. It's as easy to run between the rain drops as it is to land between stumps. You might walk away from many stump-field landings, but your airplane will probably be a washout. There seems to be a lot of this kind of terrain, but actually there are few spots where the area is very great—certainly not too great to fly around when safety dictates the course.

"Frozen wastes" sounds bad, doesn't it? But we have them of varying sizes in this big United States. Only very hardy and experienced pilots who cannot postpone their flights should attempt such areas. You can be just as much alone and lost in the county-sized wheat fields of North Dakota and Minnesota as an Alaskan "bush" pilot forced down between Galena and Nome. A forced landing is not too difficult, even in deep snow; but freezing to death at the same spot is still easier.

Ocean, Bay, and Lake Shores

There's no prettier flying than along the shore of a rolling ocean or a beautiful lake. Such flying, however, has some hazards. Certainly it should be done only under ideal conditions.

"An off-shore wind," says Roland Rohlfs, drawing on his experience as a veteran SLP in the CAA First Region, "with poor visibility can, in no time, place the unsuspecting pilot in a precarious position where he might be unable to make his way back to the shore, if flying a seaplane. Extra care should be exercised in crossing Chesapeake Bay, Delaware Bay, or Long Island Sound when visibility is poor. In poor visibility, the unskilled pilot can easily become confused for lack of a horizon. Better not cross unless the other side is clearly visible and then, if possible, it is better to cross so as to intercept the paths of boats. It's better to land near a boat than all by yourself."

Rohlfs might also have included almost any of the Great Lakes in these warnings. There's an awful lot of water, even in little Lake Huron, to fly across in a landplane. Because some of these lakes are

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TERRAIN FLYING

(Continued from page 61)

comparatively shallow, they produce high waves under windy conditions. What he has to say about fog also applies to the Great Lakes.

Watch for fog along the ocean coasts. It will sometimes lay for hours in a straight line just off-shore and then within a few minutes move inland covering a wide area. It can easily and quickly cover that seashore airport where you had planned to land. In questionable weather, always have an alternate airport in mind. Fog around Long Island is doubly dangerous because of the large bodies of water on each side, and it takes only a short time, in extreme cases, for fog to blanket the whole island.

Cities and Towns

There are two extra good reasons for not flying foolishly in these areas. One is that you can break your neck easily and sensationally if you get caught too low over such an area and are forced to land; the other is that you do flying in general a great disservice by making a nuisance of yourself and your airplane by low or unnecessary flying over populated areas. Low flying over a town is not only impolite but it actually is a hazard to you. You can be arrested by the local police for such flying. You can be cited by the CAA for such a violation. Fines and even imprisonment can be the penalty.

If you obey the Civil Air Regulations and State laws and maintain an altitude that will enable you to glide to the outskirts of town in the event of a forced landing, you will be high enough not to disturb the people on the ground with the noise of your plane.

"Smog" is prevalent around most big cities, and around smaller towns with many factories. This mixture of fog and smoke is one of your worst enemies. It easily obscures an airport. It destroys your horizon, limits both vertical and forward visibility. Stay out of it whenever you can. Where possible, land at an airport outside the limits of the smog, talk to an SLP and get his advice on flying to any airport closer in which may be covered with smog.

"Hank" Coffin of Vail Field, Los Angeles, has some sound and simple advice for pilots on the subject of smog. He sums it up with the statement that a pilot must pick his way carefully through heavy smog.

"This hazy, light fog which is a mixture of ocean moisture and manufacturing smoke," he declares, "is proving an increasing pain-in-the-neck to local pilots. Depending on wind conditions, the visiting pilot may fly 'on top' at about 4,000 feet and still see hazy landmarks on the ground, or he may drop to 1,000 feet and fly through the haze. Smog conditions usually are most severe early in the morning and burn off partially during the day. On fields near the coast, late afternoon ground fog will obscure the ground during winter months.

"There are more light airplanes per square mile in southern California than anywhere else in the United States. Airports are crowded, and traffic is a problem. A visiting pilot should use extreme care in entering a strange, crowded field. There usually are planes circling any southland field at any hour when flying is permissible, and a visitor should plan to follow a local plane into the traffic pattern."

What Coffin says about smog in California applies to such places as Buffalo, Pittsburgh, Wilmington, or Nashville. City haze or smog is a hazard which all pilots should respect. It causes trouble on the scheduled air lines, and many a trip which was in bright sunshine a few miles out of town finishes virtually on instruments.

The private pilot often has the option of several airports at large cities, and flights should be planned with such alternates in mind. It is not possible here to say which airports at major cities profit by prevailing winds and have their smog blown away, but the pilot himself ought to learn these facts about any cities into which he flies regularly.

Remember that new regulations in Part 60, CAR, require visual flight to be 1,000 feet above the highest obstacle within 2,000 feet of the aircraft.

This will affect the ticklish problem of getting into a city where industrial smoke and fog combine to restrict visibility. This rule, and known difficulties of visual flying under smog conditions, make it doubly wise for the pilot to land outside the affected area and talk it over with an SLP.

Check points in the outskirts of any large city are plentiful, but they must be of the memory kind, because no aeronautical charts are in sufficient detail to show them. Without radio, the pilot must make pin-point observations in approaching the airport. Only two real aids are available: his own memory of landmarks gathered in previous flights, or the advice of an SLP.

Small cities on coasts and rivers are not difficult to enter under hazy conditions as big, sprawling places like Chicago, Kansas City, Boston, and Detroit. Cities like Cincinnati and Pittsburgh, on rivers, give check points which are obscured only by the thickest smog. But where subdivisions, looking much alike, cover many square miles and the airport is surrounded by built-up areas, the job of finding the airport is a job for an expert.

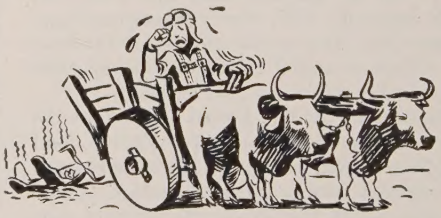
Flying in Mexico

Your SLP in this case is Leslie I. Hables, Aeronautical Inspector of the CAA with long service along the border in the Fourth Region. He has a wealth of experience which he here shares with you.

Pilots should be cautioned that the physical aspects of the terrain are entirely different from those encountered in any portion of the United States. The lowlands, while level, have not been cultivated and are covered in most instances with brush, cacti, swamps, gullies, or rocks. There are many places where only a crash landing could be effected in the event of an emergency; and in many instances were such a crash landing successful, the occupants of the aircraft would be days getting to communities or transportation. It would have to be accomplished by foot, ox team, or horseback, if the latter two could be obtained.

Some "highways" cutting through such areas are suitable for light aircraft emergency landings, but pilots should be cautioned that remote roads shown on maps as joining small communities usually prove to be foot trails or nonexistent.

The beach along the eastern coast of Mexico offers safety in the event of forced landings. The mountains are extremely steep and reach to very high altitudes. They have the characteristic violent mountain air currents and small orographic squalls and frontal danger phenomena in passes inherent in this terrain.



Many of the highland plateaus are arid and uncultivated and develop violent convectional disturbances, particularly in late afternoon, which are increased in their danger by the altitude.

Landing fields in highland areas are at high altitudes (Mexico City Airport is 7,400 feet above sea level) and pilots should be warned to maintain speed in their approach for landing and further warned concerning not becoming panicky and attempting to pull a ship off during take-off from such a field.

Landings in small fields in the proximity of villages usually attract a huge crowd of natives with no understanding whatsoever of aircraft. Unless carefully watched, they may virtually tear a ship to pieces in their interest concerning the equipment. They are entirely unconcerned about walking into the propeller or running in front of the ship during take-off.

Large birds, most particularly buzzards, are a real source of constant danger in

practically all portions of Mexico and should be scrupulously avoided in flight. Instances have been reported of such birds diving at aircraft, apparently believing the craft to be another bird.

The magnetic variation, as indicated by isogonic lines, does not at all follow

the regularity of pattern of the United States and should be most carefully studied over most any selected course by pilots attempting distance X-C flying and relying upon a magnetic compass.

Occasionally haziness, particularly in mountain areas, distorts distances, and pilots will approach what appears to be the most distant range visible, only to find immediately behind it a much higher series of peaks which he had not previously been expecting. Flight in the downwind side has sometimes ended disastrously for light aircraft as they failed to clear and could not turn back. Careful planning and the selection of well-traveled routes with established airports or emergency fields is advised. Along these the pilot will not encounter many of the described dangers.

Virtually no mechanical report or alteration is obtainable, except at the largest of airports. Supply materials are in many instances unavailable even at these; the method of repair in some instances is not that of the customary standards of the CAA-licensed A & E Mechanics (although in others it is). It is not advisable for pilots to rely on repair stations in the Republic of Mexico for maintenance or periodic checks since such services are unobtainable on short notice.

Small aircraft may find it necessary in some instances to take sufficient reserve gasoline in cans in order to get from one point to another of available supply. Some intermediate fields do not have gas available. At company fields owned by air lines, gas will not be sold unless the purchaser has a company letter. Compania Mexicana de Aviacion (CMA) authority can be obtained from CMA Operations Manager at Brownsville, Tex. Pilots of light aircraft should take a funnel and chamois, since handling of fuel at many airports is such that it is contaminated with water or dirt. Tie-down ropes and equipment are most important, and a small shovel and a few empty sacks may be the means of saving an aircraft under many circumstances.

Published charts have been found incorrect as to altitudes (some peaks have been determined to be as much as 2,000 feet higher than indicated on the map). Many good position checks, such as small communities, occasionally a railroad, or other salient visible objects will either appear on the map and prove nonexistent or stand out from the terrain and never be indicated on the map. Mountains have been found inaccurately placed as much as 30 miles on the maps, and completely disregarded in some instances. Very few communities or cities have any identification marking readable from the air.

Because of previous searches made necessary in attempt to find lost airmen, Mexican flight rules require that no flight shall be commenced without completing certain preliminary arrangements with the Mexican Government. For the convenience of pilots, the CAA has collaborated with Mexican Government aviation officials and simplified these requirements as much as possible. They are as follows: Flights of a tourist or private nature only are permitted to enter Mexico, and prior permission must be obtained from the nearest Mexican Consul for a fee of $4.12; at the airport of departure from the United States, if an inspector of Aeronautica Civil de Mexico is resident there; or by letter or wire directly to the Jafe Aeronautica Civil, Secretaria de Comunicaciones y Obras Publicas, Mexico.

If the latter method (letter or wire) is used, give the following information: Full name and citizenship of pilot; grade and number of pilot certificate and ratings; make and model of aircraft; identification (NC number); full names and citizenship of all other persons aboard; the port of entry to Mexico; the proposed date for entering Mexico; proposed itinerary of travel in Mexico, including intermediate stops and destination; and statement that such flight is for tourist or pleasure.

If the applicant gives his home address and specifically requests that he be notified at his address of the issuance of the permit, he will be so notified; otherwise the permit is sent directly to the U. S. airport named as the point of departure.

Prior to entering Mexico, a telegram must be sent, at the pilot's expense, to the following authorities: Comandante de Aeropuerto (Airport Manager) at the city of first intended landing in Mexico, which city must have an Aeropuerto Central (designated airport for Mexico) where immigration, public health, and customs officials are on duty; and Aeronautica Civil (S.C.O.P.), Mexico, D. F.

The telegram should be in this form:

Pilot John Rogers Doe, Commercial pilot, Certificate number 121212, departed Brownsville, Texas, 1315 C. A. T. en route Monterrey, Mexico, in Aircraft NC10100, with two passengers on tourist flight. Ultimate destination Mexico, D.F.

(Signed) John Rogers Doe

At some points of entry, permission may be obtained from the representative of the Mexican Ministry of Communications and Public Works, Department of Civil Aeronautics, who is on duty at the airport on the American side.

Failure to observe these rules may result in a heavy fine. Pilots are urged to be very cautious concerning infraction of minimum altitudes over communities or acrobatics in Mexico, since both are punishable by confiscation of the aircraft for infraction of regulations.

Both entry and exit must be made at the Mexican airport specified in the Foreign Flight Permit.

Upon leaving Mexico, the pilot must observe other requirements. Two telegrams, giving information similar to that required upon entry and addressed to the same authorities must be sent.

At large airports, these wires are sent without charge on the Federal Government's radio or telegraph. In the provinces and where landings are made at small villages, however, the pilot must dispatch such telegrams personally before such cross-country flight. It is advisable for him to have a signed copy of such telegrams for his own protection because failure to send such wires constitutes an infraction of the regulations.

Negotiations are continuous to eliminate as many complications from international air travel as possible, and current requirements may change. Pilots should check carefully before each flight to see whether changes have been made.

While in Mexico, pilots of the United States are not authorized (except by special written permission) to fly aircraft of Mexican registry. Breaking of this rule will result in a heavy fine.

For their own protection, pilots and occupants of a plane are advised to have a series of protective inoculations prior to travel in tropical countries.

Smallpox, typhoid, cholera, diphtheria, undulant fever, tetanus, yellow fever, and amoebic dysentery are common tropical diseases. If travel to the remoter sections is contemplated, some understanding of the causes and preventive measures, relative to these is essential. Small cuts should be treated promptly to prevent infection.

Try to arrive at a Mexican airport when officials are on duty clearing international air carrier planes. At other times, these officials may be unavailable, or it may be necessary to make special arrangements, at added cost.

Overtime charges are 30 pesos after 12 noon for immigration inspection, and a fee based on a full day's wages for each inspector involved for each three hours or fraction thereof after 2 P. M. for customs inspection. Charges also may be made for a customs guard to watch the plane, and for taxi fare to bring the inspectors to the field after 12 noon. In United States money, total fees may run as high as $15 to $20.

These are the Mexican airports of entry: Matamoros, Nuevo Laredo, Hermosillo, Monterrey, Ciudad Juarez, Mexicali, Tampico, and Mexico City.

The only United States requirement for flying private aircraft abroad is that the aircraft be airworthy and registered.

Parachutes for Passengers

SHOULD the Federal Government require airlines to provide parachutes for passengers? What would be the passenger's reaction *if* chutes were available?

Theese questions have agitated aviation circles for years. Those who believe lives could be saved in instances where there was time to evacuate passengers of an aircraft in distress are outraged at what they call the "stiff-necked" attitude of the transport carriers and the CAA in "refusing" to recognize any merit in the chutes-for-airline-passengers idea.

Becasue, in recent air-transport accidents, passengers might have been able to bail out had chutes been available, SKYWAYS decided to re-open the question and review the arguments both for and against the airlines' use of chutes. We feel it would be highly advantageous to get a cross-section of public opinion on the subject. Therefore, when you have finished reading this editorial, *please write us and let us know your opinion on the following questions*:

1. Would you like to have the airliner you ride in equipped with seat chutes for use in emergency?

2. Would the availability of a parachute give you greater sense of safety? Or would it make you fearful of the possibility of your having to jump, whether you wanted to or not?

3. If a successful "automatic-release" chute were perfected, one that would allow the pilot to push a button and send you floaing earthward when, in his opinion, it might save your life, would you accept the pilot's judgment as the best guarantee of your safety?

Please give us your name and occupation so that we may weigh realistically the replies sent us. An affirmative answer from a pilot, for example, would be of different importance than the reaction of the average airline passenger.

Officials of the Air Transport Association and the Assistant Administrator of Aviation Safety, CAA, and his medical staff have been queried by this magazine. And in addition, the testimony presented to the President's Air Safety Board, and its conclusions have been studied. The consensus of expert opinion from these sources is that even though a few lives might have been saved in a small number of accidents, others might have been lost due to the extreme hazards of parachuting untrained and unprepared civilian passengers.

"In the greatest majority of instances," they say, "the greatest chance for survival is to ride the ship down. On the side of increased safety, the answer is to continue to develop every possible improvement to aircraft engines, and crew selection and training, so that safety will steadily increase through preventive measures."

To this, however, the side believing in the desirability of chutes aboard airliners asks. "What of those instances, when it might have been possible to save even a few lives, if not all? A few saved is better than all lost."

. . . and so the battle, for and against chutes for airline passengers, goes on. Following are the arguments of both sides—in regular type are the points against providing parachutes for passengers. In italics are the statements on the pro side, refutatins of the points against chutes. Judge them, please, and write us your verdict.

1. Against chutes: Passengers range from young mothers with babies to elderly and sometimes ill men and women. They are psychologically unprepared and untrained for such a fear-inspiring action as bailing out of a plane. Also, they are not dressed for combating the extreme temperatures existing at the high-altitudes at which modern air transports fly, nor for the rigors of the rough terrain they might conceivably land in, assuming they were fortunate enough to bail out and land without injury.

For chutes: A passenger, young or old, is as psychologically unprepared to lose his life as he might be to bail out of a disabled airliner. Chances are, however, that the passenger would prefer taking advantage of a chance to save his life by chute than to ride a big airliner down to a doubtful landing. Similarly, the average passenger would gladly accept the risk of withstanding the so-called rigors of rough terrain. Better a leg in a cast, say the chute proponents, than a body in a casket.

2. Against: Rescue would be difficult when parachuted passengers are distributed over a wide area, as they would be.

For: No matter how difficult rescue might be, there's still a good chance of fairly quick rescue what with the helicopter and today's air rescue teams. Too, the pilot or copilot could carry a compact "Gibson-Girl" radio, such as was used in World War II for aiding rescue teams in finding stranded flyers.

3. Against: Modern aircraft fly too fast to allow successful jumps, and there would be too many casualties from chutes caught on the disabled plane's tail surfaces.

For: Today's airliners do not fly as fast, in the majority of cases, as our military planes. And there is many a war pilot alive today, thanks to his parachute. Also, as far as the number of passengers having to get out of an airliner today is concered, witness the bailing out, successfully, of 35 men aboard a military transport in Oklahoma some time ago!

4. Against: There is seldom enough time to get passengers out and there would be no trained "jump master" to evacuate them.

For: Time is an elusive factor where lifesaving is concerned. In two recent airline accidents where passengers were killed, there were known intervals of from 7 to 13 minutes in which all passengers might have been evacuated by parachute. Even if there were only time to get a few passengers and, perhaps, the copilot out, it would be saving some lives and would also enable officials investigating crashes to get information regarding the cause of the plane's disability from a reliable source, thereby helping immeasurably in understanding what causes air transport mishaps. Better to know than to have to guess. As far as a "jump master" is concerned, a steward trained as a "jump master" could get the passengers out successfully. The so-called "fear complex," is of no consequence.. Consider the number of men and women who have jumped from burning buildings in an attempt to save their lives. That same attitude, would show up in passengers aboard an airliner, too.

These are but a few of the arguments, pro and con, regarding the advisability of chutes on commercial airliners. To many, the arguments against chutes are the same type used in earlier days to fight the life preserver idea on ships at sea. The life preserver won that right and today has many "saves" to its credit.

The backers of chutes for airliners believe that if the people were carefully educated in the acceptance of chutes as safety measures, and were briefed by the airlines in their use, they would soon accept the whole idea with no more resistance than they have shown other safety ideas.

How do you feel about it? Do you want chutes when you fly the airlines? Just as the people instruct the Congress, perhaps it is necessary here to instruct the airlines. You can help in finding the proper solution to this question by making your opinion known to us. *Write us today!*

J. FRED HENRY.